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A CONTINUATION OF THE GUN WEAPON SYSTEM REPLACEMENT PROGRAM C00--ETC(U)

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N00174-79-C-0035

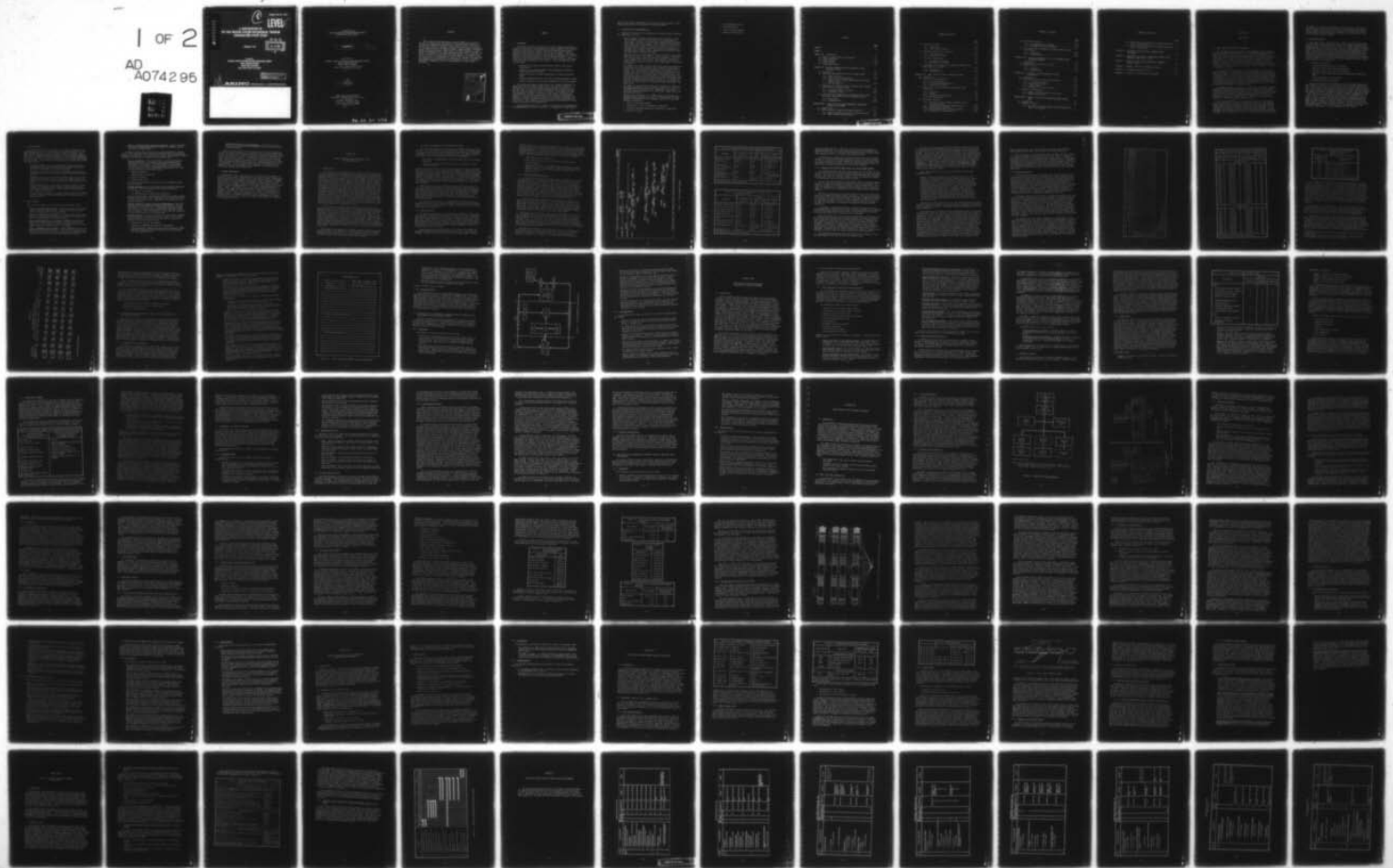
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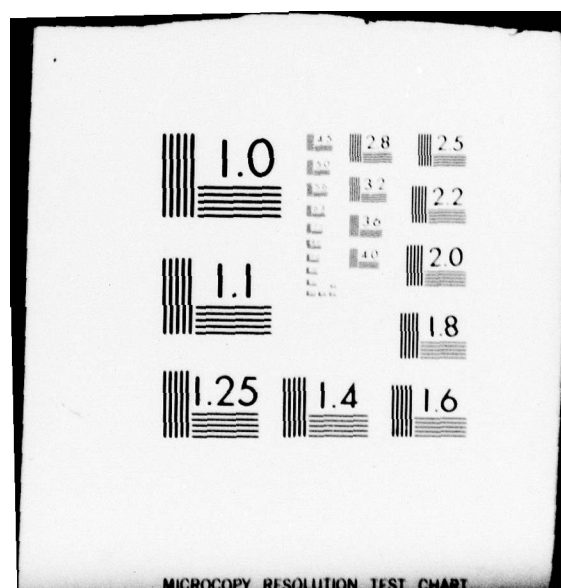
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**A CONTINUATION OF
THE GUN WEAPON SYSTEM REPLACEMENT PROGRAM
COORDINATION EFFORT STUDY**

September 1979

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Prepared for
MANAGER, SURFACE WEAPONS SYSTEMS MAINTENANCE BRANCH
NAVAL ORDNANCE STATION
INDIAN HEAD, MARYLAND
under Contract N00174-79-C-0035

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ABSTRACT

The Gun Weapon System Replacement Program (GWSRP) has initiated actions to coordinate various aspects of gun weapon system support with the Destroyer Engineered Operating Cycle (DDEOC) Program. This study presents the results of analyses of baseline overhaul repair requirements for gun weapon systems, the GWSRP and DDEOC Program Management Information System (MIS) data interface, GWSRP support to DDEOC Program site teams, update of NAVSEAINST 8300.2A "Gun Weapon System Replacement Program", and overall coordination of the GWSRP and DDEOC Program. All analyses were limited to items of significance to both the GWSRP and the DDEOC Program. The conclusions and recommendations presented are intended to provide program managers with guidelines for the coordination of their respective maintenance management activities and improvement of their current procedures.

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SUMMARY

1. BACKGROUND

This report presents the results of a study to improve coordination between the Gun Weapon System Replacement Program (GWSRP) and the Destroyer Engineered Operating Cycle (DDEOC) Program performed by ARINC Research Corporation under Contract N00174-79-C-0035 for the Manager, Surface Weapons Systems Maintenance Branch, Naval Ordnance Station, Indian Head, Maryland. Two previous studies on this subject were submitted to the Naval Ordnance Station, Indian Head, under Contract N00174-78-C-0105. Those studies provided the background and basis for further analysis and support in the task areas specified in this contract. This study addresses five specific tasks:

- Analysis of Gun Weapon Systems Baseline Overhaul (BOH) Repair Requirements
- Analysis of the GWSRP and DDEOC Program Management Information System (MIS) Data Interface
- Analysis of Ways to Provide GWSRP Support to DDEOC Program Site Teams
- Updating NAVSEAINST 8300.2A "Gun Weapon System Replacement Program"
- Continued Support to the Overall Coordination of the Two Programs

The surface gun weapon systems analyzed are currently managed by the GWSRP and installed in DDEOC Program ships. The initial step of the analyses was to collect and evaluate applicable data and documents. At the same time, we identified potential opportunities to improve integration of existing maintenance support procedures. Discussions were held with appropriate technical activities to gain further information and insight into the analyzed documentation and to discuss the preliminary findings. Tentative integration actions and procedural improvements were developed, analyzed, and again presented to the principal activities for their review. Their comments were incorporated in the formulation of this report's conclusions and recommendations.

These analyses resulted in a number of conclusions and recommendations. The recommendations are for actions which, if implemented, should provide

better joint program coordination and enhance the overall support of gun weapon systems within the framework of the DDEOC Program.

2. CONCLUSIONS AND RECOMMENDATIONS

The major conclusions and recommendations resulting from the analysis are summarized as follows:

- The gun weapon system BOH requirements need the periodic review from the GWSRP to ensure their accuracy and responsiveness to Fleet needs. Analysis of post-baseline overhaul Maintenance Data System (MDS) data for gun weapon systems experience can provide a significant input to the GWSRP's review. Review of FF-1052 Class BOH requirements indicates a need to discontinue the Class "B" overhauls for gun weapon systems unless they are accomplished in accordance with technical repair standards or the specific "item-by-item repairs" resulting from POT&I.
- Some data elements of the GWSRP MIS are not currently in the DDEOC RMMS and vice versa. The transfer of data relating to configuration, inspections, and scheduling could be exchanged to improve the overall capability of each system. Data should be exchanged by means of direct hard-copy transfer with minimum changes to existing programming.
- The GWSRP and the DDEOC Program could benefit from the application of Material Condition Assessment (MCA) procedures to gun weapon systems and their subsequent integration into the DDEOC site team effort. This process could be initiated by the development of a procedure for reading the EP2 panel time meter found in the 5"/54 caliber gun mounts. The actual conduct of the MCA procedure poses the greatest problem because current billet authorization does not specify personnel with the requisite experience. The TYCOMs, working with the GWSRP and DDEOC managers, would have to identify the personnel who could assess the gun weapon system during DDEOC site team visits.
- The GWSRP is a dynamic program that must coordinate the effort of many Navy organizations while keeping up to date with current Navy and NAVSEA policies and directions. NAVSEAINST 8300.2 series should be updated periodically to reflect current GWSRP policy and procedures in effect.
- Several areas of interest to the GWSRP require investigation to improve program procedures and could be integrated with the DDEOC Program to the benefit of both programs. Some of the areas that should be analyzed are:
 - Status of Programmed OrdAlts
 - Installation of On-Line Terminals for GWSRP MIS
 - Waterfront Equipment Removal and Installation Capabilities
 - Future EOC Program

- Class Maintenance Plans
- Program Schedules
- DD-963 Class EOC Program
- Ordnance System Updates

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CHAPTER ONE

INTRODUCTION

1.1 GWSRP AND DDEOC HISTORICAL BACKGROUND

The Gun Weapon System Replacement Program (GWSRP) was originated in 1964 by the Bureau of Naval Weapons as the Ordnance Replacement Program. The mission of the program was to provide a source of replacement for guns, fire control, and related equipment, most of which had been installed in the mid- to late-1940s and had reached a state of disrepair through extended service. Under the program, available gun mounts, computers, radars, and related equipment were overhauled in a depot assembly line operation and used to replace badly worn guns and related systems installed in the Fleet. Removed items were placed in a repair pipeline to keep the replacement cycle going.

Intensified use of gun mounts in the Southeast Asia conflict and a drastic reduction in rotatable pool assets contributed to increased maintenance requirements of the gun weapon systems and highlighted the need for an efficient GWSRP. To keep pace with the increasing volume and complexity of maintenance in an era of tightening defense budgets, the GWSRP planning process requires coordination with other maintenance management programs. A principal requirement is to coordinate and integrate the activities of this established maintenance program with similar activities of the Destroyer Engineered Operating Cycle (DDEOC) Program.

The DDEOC Program was undertaken in August 1974 to develop a detailed maintenance strategy and implementation plan to support a 54 \pm 6 months operating cycle for the FF-1052, DDG-37, and CG-16 and -26 classes of ships. As this and other maintenance-related programs concurrently evolved, CNO Project Red "E", now the Ship Support Improvement Project (SSIP), was created in January 1975 to draw together, coordinate, and integrate all maintenance-related programs for surface ships.

Part of the SSIP effort is to explore and exploit the substantial benefits from the use of established products, procedures, and organizations, common to EOC programs. Just as benefits are available from the similarities between EOC programs, benefits are also available from the similarities of separate but interrelated maintenance programs. Several programs have been established in the past to solve particular maintenance problems, improve material condition, or increase operational availability.

The GWSRP is an established maintenance program working in parallel with and providing input to the DDEOC Program. The similarities and common goals of GWSRP and DDEOC need to be coordinated to minimize duplication of requirements and procedures and to maximize the effectiveness of the use of resources by both programs.

1.2 REPORT BACKGROUND

This report is the second analysis resulting from the initial study conducted under Contract N00174-78-C-0105. The initial study identified areas of common interest between the GWSRP and the DDEOC Program and made recommendations for integrating these interests. ARINC Research Corporation Publication 1655-01-1-1779, dated June 1978, reported the results of that study. That effort was directed toward developing recommendations that would improve coordination between the Gun Weapon System Replacement Program and the Destroyer Engineered Operating Cycle Program. As a result of that study seven areas were identified as prime candidates for analyses that would enhance their respective maintenance management support of gun weapon systems. These areas were:

- Inspection Procedures
- Bid Specifications Written for Overhauls
- Baseline Overhaul (BOH) Repair Requirements
- Management Information Systems Data Exchange
- Material Condition Assessment Procedures Conducted by DDEOC Site Teams
- Class Maintenance Plan Requirements
- Program Scheduling Requirements

The first two areas were considered to be of the highest priority and were therefore treated in the first analysis under Contract N00174-78-C-0105. The results of that analysis can be found in ARINC Research Publication 1655-02-2-1818. Three topics treated in this report -- baseline overhaul repair requirements, Management Information Systems (MIS) data exchange, and material condition assessment procedures conducted by DDEOC site teams -- were studied as a continuation of analysis efforts recommended in Publication 1655-01-1-1779. Two additional topics were analyzed in this study -- update of NAVSEAINST 8300.2A "Gun Weapon System Replacement Program" and the provision of continued support to the coordination of the GWSRP and DDEOC Programs -- because they were considered to be essential GWSRP support requirements warranting analysis. The last two of the seven identified topics -- class maintenance plan requirements and program scheduling requirements -- are not addressed in this report.

1.3 STUDY OBJECTIVE

The primary objective of this study is to define procedures for the integration of three of the identified specific areas of interest to the GWSRP and DDEOC Program: baseline overhaul repair requirements, interfaces between program management information systems, and GWSRP support to site teams. Included in the study's objective is the update of NAVSEAINST 8300.2A and provision of support for improving overall coordination between the two programs. To meet this study's objective we undertook the following specific tasks:

- Develop procedures for the implementation of interfaces between the GWSRP and the DDEOC Program in the development and update of BOH repairs requirements for gun weapon systems.
- Develop procedures that provide for an exchange of software and data between the GWSRP and the DDEOC Program management information systems.
- Recommend procedures that would enable GWSRP expertise to be made available to the DDEOC Program site teams and DDEOC Program site team information on gun weapon systems to be made available to the GWSRP.
- Update NAVSEAINST 8300.2A "Gun Weapon System Replacement Program". Document the gun weapon system support interfaces that will be included in the DDEOC Program and other newly established maintenance management programs.
- Identify existing and potential areas of interest between the GWSRP and DDEOC Program and make recommendations for integrating these mutual interests.

1.4 STUDY APPROACH

This study was conducted in five separate and independent tasks:

- Task 1: BOH Repair Requirements. Develop procedures for the GWSRP interface with the DDEOC Program in developing and updating BOH repair requirements for gun weapon systems.
- Task 2: Program MIS Data Interface. Develop procedures that provide for an exchange of software and data between the GWSRP and the DDEOC Program management information systems.
- Task 3: GWSRP Support to Site Teams. Recommend procedures that would enable GWSRP expertise to be made available to the DDEOC Program site teams and DDEOC Program site team information on gun weapon systems to be made available to the GWSRP.
- Task 4: NAVSEAINST 8300.2A Update. Update NAVSEAINST 8300.2A "Gun Weapon System Replacement Program" to document the gun weapon system support interfaces that will be ongoing with the DDEOC Program and other newly established maintenance management programs.

- Task 5: Continuing Inter-Program Coordination. Provide continuing engineering and management effort to support the GWSRP's integration with the DDEOC Program.

Although each task stands alone and was analyzed separately from the others, it was important to the total effort that a basic set of analytical procedures be applicable to the conduct of all tasks. The approach to Tasks 1 through 4 of this study consisted of the following steps:

- Collect Information. The first step was to collect information concerning the specific procedures and program elements being followed in each task area. This information consisted mostly of documents in the form of existing procedures, instructions, reports, inspection results, maintenance requirements, etc. Data were acquired from the following sources:

- GWSRP documentation
- DDEOC Program documentation
- Interview results
- ARINC Research files

This process continued throughout the study with emphasis during the first months.

- Analyze Information. The second step was to analyze the available information. The analysis was directed toward determining:

- The methods of integration
- The ramifications of implementing integration

Only gun weapon systems previously determined to be common to both programs were analyzed. Upon completion of this step, we developed initial findings for potential improvements and integration with existing procedures.

- Develop Tentative Integration Procedures/Improvements. The third step was to develop tentative integration procedures and program improvements for the four tasks. Documentation analyses coupled with continuous contact with program personnel resulted in these initial findings. Much of the activity in this step was conducted in concert with those in the following steps.

- Conduct Interviews. The fourth step was to interview the responsible principals in the GWSRP and the DDEOC Program. This activity continued throughout the entire study but after we reached our initial findings, we concentrated on:

- Expanding the scope of the findings
- Validating recommended procedures and improvements
- Gaining additional feedback from the various echelons of GWSRP and DDEOC Program participants concerning their involvement with the designated tasks

- Develop Conclusions and Recommendations. The final step was to develop the conclusions and recommendations that resulted from the preceding analyses.

Task 5, supporting the overall coordination of the two programs, was a continuing effort accomplished concurrently with the analysis described above. Our approach was to obtain additional information concerning aspects of both the GWSRP and the DDEOC Programs in the course of conducting the Task 1 through Task 4 analyses. In developing that approach we analyzed newly acquired information to identify future coordination actions. Additional information acquired that amplified or altered previous conclusions was documented. The final phase of this task was the presentation of updated conclusions and recommendations regarding the Gun Weapon System Replacement Program Coordination Study.

1.5 REPORT ORGANIZATION

Chapter Two of this report describes the results of the analysis of baseline overhaul repair requirements for gun weapon systems. Chapter Three gives the results of the analysis of the data interface between the GWSRP and the DDEOC Program management information system. Chapter Four presents the results of the analysis of the integration of GWSRP expertise into DDEOC Program site teams. Chapter Five describes the results of the efforts applied to update NAVSEAINST 8300.2A "Gun Weapon System Replacement Program." Chapter Six documents the findings of the continuing effort to coordinate the GWSRP and the DDEOC Program. Chapters Two through Six are complete in themselves so that they can, if desired, be distributed as separate reports. Chapter Seven summarizes the status of all efforts conducted as part of the GWSRP coordination study. Appendixes A through E present data supporting the analyses in Chapter Two through Six. Appendix F is a glossary of terms.

CHAPTER TWO

BASELINE OVERHAUL REPAIR REQUIREMENTS FOR THE GUN WEAPON SYSTEM

2.1 INTRODUCTION

For ships entering the DDEOC Program (except the DD-963 Class), the baseline overhaul has been established as a prerequisite to entering the extended operating cycle. The Engineered Operating Cycle (EOC) is that period of time from the completion of a ship's overhaul through the normal operating period and subsequent regular overhaul (ROH). As each DDEOC ship enters the program it will undergo an initial BOH and then enter its EOC as prescribed in the Class Maintenance Plan (CMP). The key elements that will be established upon completion of BOH are the DDEOC Class configuration baseline and the DDEOC Class material condition baseline. The configuration and material condition of a given ship completing BOH will be stated in terms of exceptions to the class baseline definitions. The importance of correctly determining those requirements to be included in the BOH is important to the success of the DDEOC Program. Failure to include an overhaul repair requirement in the material condition baseline could result in an equipment not receiving depot-level repair maintenance for a period of four to five years in addition to the time since it previously was repaired during ROH. Special Restricted Availabilities (SRAs) scheduled during the engineered operating cycle could be utilized to conduct varying amounts of the depot hull repairs.

In the interest of assuring uniform material condition for the gun weapon systems of ships completing BOH, the coordination of GWSRP expertise for BOH repair requirements development and update process was recommended. Through a continuing process of input from the GWSRP, the DDEOC can be responsive to the latest needs of the gun weapon systems. Since the BOH is a one-time availability for each ship of the class, it is essential that changes to baseline Ship's Alteration and Repair Packages (SARPs) formulated for the BOH be made upon recognition of the requirement. Since the next regular overhaul is approximately 60 months after the BOH, it is essential that the gun weapon systems receive the requisite depot-level repairs during BOH to enhance maintenance and operational success during the extended overhaul cycle.

This analysis was conducted to establish procedures whereby the GWSRP expertise could be made available to the development and update of DDEOC Program BOH repair requirements on a continuing basis and to determine if any of the existing BOH repair requirements needed updating.

2.2 BOH REPAIR REQUIREMENTS FOR THE GUN WEAPON SYSTEM

BOH repair requirements are developed by the DDEOC Program on a class basis, i.e., FF-1052, DDG-37, and CG-16 and CG-26 classes. The DDEOC Repair requirements for baseline overhaul identify by class the repairs essential to prepare a ship for entry into the DDEOC Program. Two basic considerations were used in the compilation of BOH repair requirements:

- The repairs or refurbishments could be analytically or historically justified.
- Only specific actions defined well enough to prepare job orders would be included.

Appendix A contains the pertinent gun weapon system BOH repair requirements for the FF-1052, DDG-37, and CG-16 and CG-26 classes. As can be seen from the examples, the BOH repair requirements are ordered by equipment Ship Work Authorized Boundaries (SWABs). This analysis is concerned only with SWABs related to gun weapon systems (480s and 710s). The BOH repair requirements identify the equipment and its associated repair; quantity of equipment on each ship; source of information that led to the entry in the class listing; and information pertaining to related repair, alterations, or other amplifying comments.

ARINC Research performed an initial analysis of FF-1052 and DDG-37 Class BOH repair requirements specified for gun weapon systems under Contract N00174-C-78-C-0035. Absent from both of the BOH repair requirements were any requirements for repair of the 5"/54 Mk 42 Gun Mounts. NAVSEA-62YG personnel reported this was proper since gun mount overhaul requirements are contingent upon results of the MCR. The absence of repair requirements for the 5"/54 Mk 42 Gun Mounts does not mean BOH repairs are not to be performed.

The result of that study was a recommendation to analyze BOH repair requirements for gun weapon systems in depth. One product of the analysis was to be an indication of inputs that could be made to update the existing specifications, as required.

2.2.1 Data Collection

The data collection phase of this effort was initiated by collecting the BOH repair requirements for the DDEOC Program ships. These requirements were reviewed and reduced to the applicable gun weapon systems and equipments that would be analyzed in this study. To aid in the analysis of the BOH repair requirements, we collected the SARPs and the end-of-BOH reports. These documents were reviewed to compare the prescribed BOH repair requirements with the actual repairs funded by the Type Commanders (TYCOMs) and accomplished during the overhaul.

Interviews with personnel from activities supporting the GWSRP and the DDEOC Program provided an important source of data. These data were primarily collected as a result of conversations with personnel familiar

with the effects that BOH repair requirements were having on the maintenance support of gun weapon systems. The final source of data was the Maintenance Data System (MDS) -- a subsystem of the 3-M System. Pre-BOH and post-BOH MDS data from FF-1052 ships were analyzed and compared to determine post-overhaul maintenance burdens and the effectiveness of the BOH repair requirements. Additional documents used in this task include the following:

- DDEOC Management Plan of May 1979
- PERA (CRUDES), Surface Ship's Pre-Overhaul Planning Guide
- 3-M Documentation
- *Assessing the Effect of the DDEOC Program on Indication of Ship Material Condition - Approach and Initial FF-1052 Class Results*; ARINC Research Publication 1653-01-3-1848, December 1978.
- OPNAVINST 4700.7E

2.2.2 DDEOC Program Considerations

The analysis of the DDEOC Program BOH repair requirements was limited to the FF-1052 Class. Although there are four other classes of ships in the DDEOC Program -- DDG-37, CG-16, CG-26, and DD-963 -- only the first three of those classes will undergo a BOH. Of the classes undergoing a BOH, only the FF-1052 Class provided a large enough data base of completed baseline overhauls. Figure 2-1 is the DDEOC Program schedule overview; it shows the dates when the assigned classes of ships enter the program. As of 1 August 1979, 25 FF-1052s and 2 DDG-37s had completed BOH. No CG-16 or CG-26 Class ships had completed BOH. Although the analysis was limited to the FF-1052 Class, Tables 2-1 and 2-2 show significant similarity among the major gun weapon systems on three of the four classes.

Certain Gun Fire Control System (GFCS) components are common to the DDG-37, CG-26, and FF-1052 Class ships -- specifically, the AN/SPG-53A radar (APLs 56995306 and 56995306) and the radar signal processing equipment (RSPE -- APL 78640113). Both classes of ships also carry Mk 47 computers, Mk 2 director drive controls, and Mk 16 stable elements, differing only in modification (Mod) number. Where the three classes have similar equipments, the DDG-37 Class carries the oldest modification.

All ships in the CG-26 Class carry the Mk 6 GFCS Mod 8 version except for the BELKNAP (CG-26), which has had the Mod 16 installed. All CG-26 Class ships have been nominated to receive the Mod 16 either at baseline overhaul (CG-26, -27, -28, -30, -32, -33) or at the following ROH (CG-29, -31, -34). The gun fire control system that supports the 3"/50 caliber gun mounts will be removed along with these gun mounts during BOH. The Harpoon weapon system and Close-In Weapon System (CIWS) will subsequently be installed on the CG-16 and CG-26 Classes.

All ships of the FF-1052, DDG-37, and CG-26 Classes are equipped with 5"/54 caliber single gun mounts, Mark 42 Mod 9 or 10. All ships of the FF-1052 Class except the USS KNOX, FF-1052, have the Mod 9 gun mount installed. The Mod 10 is installed on all DDG-37 and CG-26 Class ships

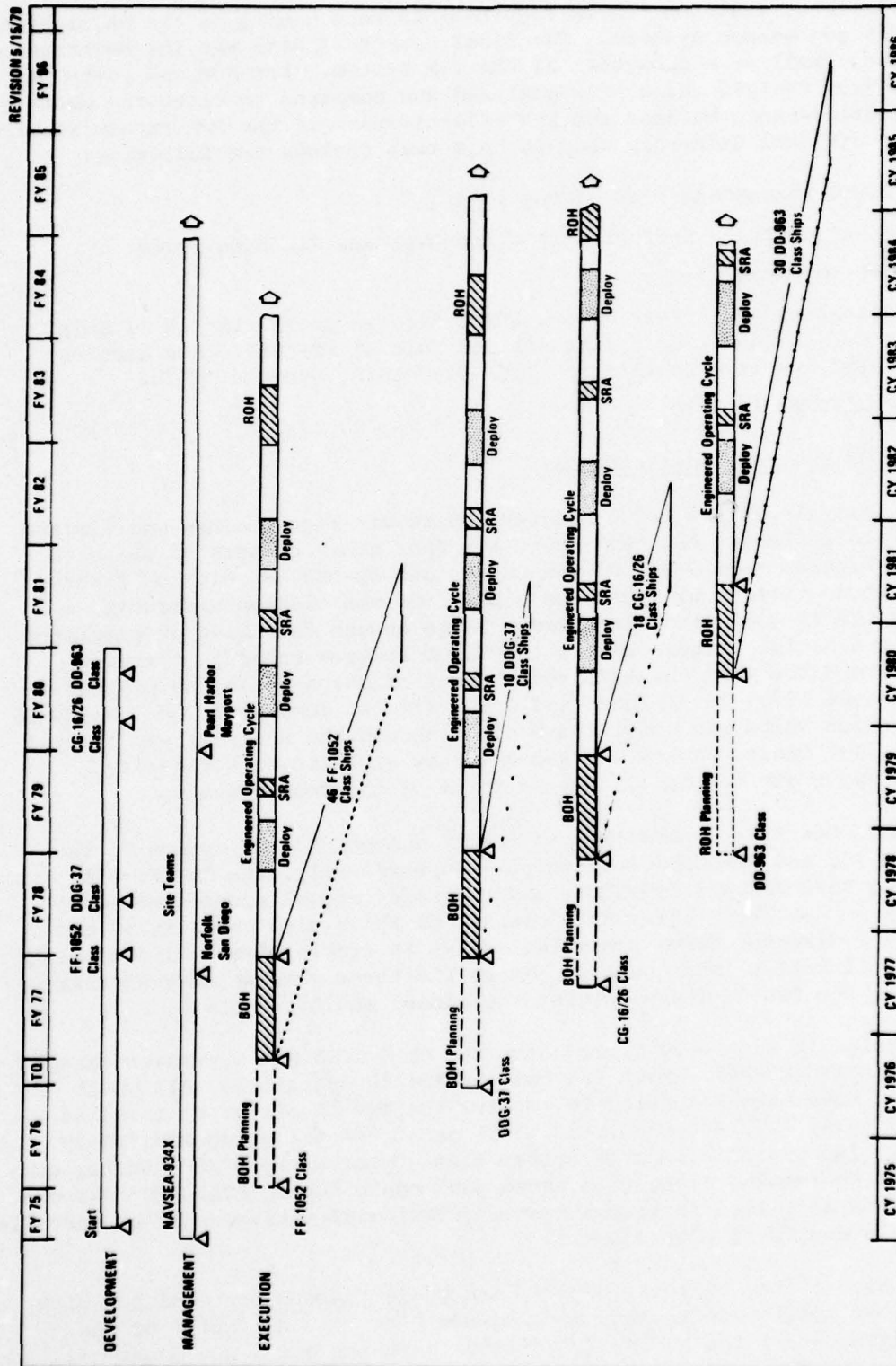


Figure 2-1. DDEOC PROGRAM SCHEDULE

Table 2-1. MK 68 GUN FIRE CONTROL SYSTEM OF DDEOC PROGRAM CLASS SHIPS				
Equipment	Class			
	FF-1052 Mods 11, 13, 14	DDG-37 Mod 6	CG-16 N/A	CG-26 Mods 8 and 16*
AN/SPG-53() Radar	AN/SPG-53 (A, F, D)	AN/SPG-53(A)	N/A	AN/SPG-53(A, F)
Computer Mk 47	Mods 10, 11	Mod 7	N/A	Mod 9, Mk 60 Mod 1
Director Mk 68	Mods 3, 7	Mod 2	N/A	Mods 3, 9
Stable Element Mk 16	Mod 2	Mod 1	N/A	Mods 2, 11
Director Drive	--	--	N/A	--
Control Mk 2	Mod 3	Mod 2	N/A	Mods 3, 7
Radar Signal Processing Equipment Mk 1	Mod 1	Mod 1	N/A	Mod 1 Digital Video Processor
Range Finder Mk 75	Mods 1, 3	Mod 1, Mk 41 Mod 10	N/A	Mods 1, 3
*USS BELKNAP (CG-26) has Mod 16 installed.				

Table 2-2. 5"/54 CALIBER GUN MOUNT MK 42 SYSTEM OF DDEOC PROGRAM CLASS SHIPS				
Equipment	Class			
	FF-1052 Mods 9, 10*	DDG-37 Mod 10	CG-16 N/A	CG-26 Mod 10
Carriage Assembly Mk 35	Mod 3	Mod 4	N/A	Mod 4
Control Gun Mount Mk 114	Mods 0, 1	Mod 2	N/A	Mod 2
Hoist, Ammo, Upper Mk 2	Mods 4, 5	Mods 6, 7	N/A	Mods 6, 7
Slide Assembly Mk 31	Mod 2	Mod 3	N/A	Mod 3
Rammer Assembly Mk 2	Mod 2	Mod 3	N/A	Mod 3
Ejector, Case, Assembly Mk 2	Mod 2	Mod 2	N/A	Mod 2
Housing Assembly Mk 11	Mod 2	Mod 3	N/A	Mod 3
Shield Assembly Mk 61	Mod 0	Mod 11	N/A	Mod 11
Hoist, Ammo, Lower	Mk 5 Mods 0, 11	Mk 7 Mods 0 through 19	N/A	Mk 7 Mods 0 through 19
Gun Barrel Mk 18	Mods 3, 5	Mod 3	N/A	Mod 3
*USS KNOX (FF-1052) has Mod 10 installed.				

and the USS KNOX (FF-1052). Basically, the Mk 42 Mod 10 gun mount is a modernized Mk 42 Mod 7 gun mount incorporating many of the desirable features of the Mk 42 Mod 9. The Mod 10 has replaced the Mod 7 during regular ship overhauls as Mod 10 gun mounts have become available.

Since there is a great deal of similarity among the major gun weapon systems (5"/54 Caliber Single Gun Mount and Mk 68 Gun Fire Control System) of the ship classes of the DDEOC Program, the analysis of the FF-1052 Class BOH repair requirements develops conclusions and recommendations that are applicable to similar equipments on the other DDEOC classes.

2.2.3 Analysis of BOH Repair Requirements for the Gun Weapon System

We reviewed the DDEOC BOH repair requirements for the FF-1052, DDG-37, and CG-26 Class ships to determine required repairs for the major gun weapon systems. All major Mk 68 gun fire control system equipments and components for each ship class will nominally undergo a Class "B" overhaul by a depot-level maintenance activity during baseline overhaul.

The gun fire control system may also undergo Class "A" repairs, depending upon its material condition as reported by the Pre-Overhaul Test and Inspection (POT&I) and confirmed by Material Condition Review (MCR). These Class "A" repairs would be performed by Naval Ordnance Station, Louisville (NOSL) in accordance with NAVSEAINST 8300.2A (Gun Weapon System Replacement Program).

There are no provisions for specific repairs for the 5"/54 caliber gun mounts in the DDEOC Program BOH repair requirements. Repairs are performed in accordance with the turnaround program as specified in NAVSEAINST 8300.2A. The decision to perform a Class "A" repair (performed by NOSL), Class "B", or other specific repairs (by IMA or ship's force) is made on the basis of the material condition of the gun mount as determined by POT&I and MCR inspections.

To determine if BOH requirements for existing gun weapon systems are being completed as specified in the DDEOC Class BOH requirements, we analyzed FF-1052 Class SARPs and end-of-BOH reports. The analysis was restricted to the FF-1052 Class for the reason previously discussed.

From the FF-1052 Class, 25 ships had completed BOH as of 1 August 1979. We obtained Ship Alteration Repair Packages (SARPs) or end-of-BOH reports from a total of 24 of those 25. The end-of-BOH reports are developed several months after completion of BOH, so they will be reviewed later than the SARPs. In addition, two SARPs were obtained from the FF-1053 and FF-1059 which have not yet completed BOH. An analysis of these documents indicates that the majority of BOH requirements are being completed as specified. Exceptions to this finding were specific Class "C" repairs being performed in lieu of Class "B" repairs specified by BOH requirements.

The following paragraphs describe the findings of the analysis of the BOH requirements for the FF-1052 Class gun weapon system.

Selected proposed SARPs and end-of-BOH material condition reports for FF-1052 Class ships that underwent BOH were analyzed to uncover any trends or irregularities in the established BOH requirements for the gun weapon systems. Specifically, SWABs in the gun fire control system (SWAB 481) and the 5"/54 caliber gun mount (SWAB 711) were analyzed. This analysis showed that the majority of BOH requirements of the designated gun weapon system were accomplished as specified. Exceptions to this finding were specific repairs being accomplished or components being selected for the turnaround program as a result of MCRs conducted by appropriate Naval Sea Centers (NAVSEACENS). Staff and field representatives of NAVSEACENPAC, COMNAV-SURFLANT, and COMNAVSURFPAC voiced a growing concern that the current Class "B" BOH repair requirements are not definitive enough to result in efficient and meaningful repairs.

The following definition of a Class "B" overhaul is taken from OPNAVINST 4700.7E:

Class B - Work that requires such overhaul or repairs as will restore the operating and performance characteristics of a system, subsystem, or component to its "original" design and technical specifications. If it is required to restore the operating and performance characteristics of an item to other than its original design and technical specifications, it must be so specified and the performance criteria defined. ShipAlts, OrdAlts, field changes, and modifications, even if applicable, are not to be accomplished unless specified by the customer. Maintenance adjustment and calibration routines specified by the applicable instruction manual, unless superseded by authority, are required. The repair activity will demonstrate that the end product successfully meets all performance criteria specified by the governing specifications.

Although this definition seems to very specifically define the requirements of a Class "B" overhaul, it can and has been interpreted to mean different repairs when applied to particular systems or equipments by different repair activities.

The consensus of the GWSRP activities and TYCOMs was that the current definition of a Class "B" overhaul is very general and does not provide the repair facility with the proper guidance to accomplish specific corrective maintenance. This can lead to problems such as unnecessary removal and tearing down of an equipment or component, often resulting in funding problems with private shipyards. A suggested solution to this problem was to specify definitive repairs in accordance with discrepancies identified in the MCR inspection and the POT&I (instead of the Class "B" overhaul requirement). The intent of this proposal was to eliminate the performance of unnecessary work on the gun weapon system components and to upgrade the quality of required work by specifically identifying what had to be done. In keeping with the goals of the DDEOC Program, it is recommended that the requirements for Class "B" overhauls for selected gun weapon system equipments and components be discontinued and that specific repairs be accomplished during the baseline overhaul on the basis of the results of the

MCR and POT&I reports. Once the MCR begins to serve as the gun weapon system inspection for POT&I, this input will come from POT&I alone.

Class "B" repairs to the Mk 42 Mod 9 5"/54 Gun Mount were for the most part not accomplished. There was no mention of any Class "B" repairs to be performed or having been performed on the repair profile, standard baseline SARP, or any of the end-of-BOH material condition reports. Maintenance performed on the gun mount consisted mainly of specific repairs to individual components and equipments or Class "A" repairs performed by NOSL. Only two gun mounts included in the SARPs analyzed underwent a Class "B" overhaul. Table 2-3 presents the results of the FF-1052 Class BOH requirement assessments.

2.2.4 MDS Data Analysis

An analysis was undertaken to determine what effect BOH repairs have had on the post-overhaul maintenance burden of the major components of the Mk 68 Gun Fire Control System and the 5"/54 Caliber Gun Mount Mk 42 Mod 9s installed on the FF-1052 Class ships. Maintenance Data System (MDS) data from pre-BOH and post-BOH FF-1052 ships were analyzed and compared to determine post-overhaul maintenance burdens and the effectiveness of their repair requirements. The analysis for this MDS comparison was accomplished by ARINC Research Corporation in the *DDEOC Effectiveness Assessment* of June 1979 (Publication 1653-01-SR-1966). As more data are gathered, the analysis could be used to support any recommended changes to BOH repair requirements that would correspond to significant conclusions.

The analysis of MDS data is based on a comparison of ships of the same class before and after entering the DDEOC Program. The definitions used for these two categories of ships within the class are baseline ships and DDEOC ships. A baseline ship is defined as one that has not yet entered the DDEOC Program. A DDEOC ship is one that has completed the BOH and entered the engineered operating cycle. MDS data from similar periods of operation were compared. The time from the end of overhaul (ROH or BOH) to the start of the first deployment was used as the period of comparison. Table 2-4 lists the baseline and DDEOC ships, their end of overhaul dates, the dates of their first deployments, and the number of days between the two dates. Table 2-5 lists the gun weapon systems equipments and components that were analyzed.

The baseline data base contains information on approximately 7,200 days of operation, and 3,459 days of operation are represented in the DDEOC data base. MDS data are complete from 1 January 1970 through 31 January 1979. As of 31 January 1979, there were 14 DDEOC ships that had completed baseline overhauls and at least 90 days of operation. Two ships, the FF-1064 and FF-1087, were not included in the baseline data base since they were both overhauled while in a forward deployed status and did not have nondeployed periods after overhaul. In addition, the FF-1052 is the only ship in the class that has had two regular overhauls. Because it had completed BOH, nondeployed periods were used in the analysis to increase the baseline data base.

Table 2-1. FF-1052 CLASS BOH REQUIREMENT ASSESSMENT																											
System/ Equipment	Repair Profile Jun 1975	Standard Baseline SAPP Apr 1976	End-of-BOH Material Condition Reports										Proposed/Authorized SAPPs														
			FF-1057 Dec 1976	FF-1060 Apr 1979	FF-1061 Jun 1978	FF-1070 Dec 1978	FF-1073 Jun 1978	FF-1074 Jan 1978	FF-1076 Jun 1978	FF-1080 Jun 1978	FF-1082 Mar 1979	FF-1084 Jun 1978	FF-1085 May 1978	FF-1086 May 1978	FF-1089 Jun 1978	FF-1053 Jul 1976	FF-1056 Sep 1977	FF-1059 Sep 1978	FF-1066 Sep 1977	FF-1069 Sep 1977	FF-1077 Mar 1978	FF-1083 Mar 1977	FF-1088 Mar 1977	FF-1090 Feb 1978	FF-1091 May 1977	FF-1092 Apr 1978	FF-1093 Jun 1977
Mk 47 Computer	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mk 68 Gun Director	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mk 16 Stable Element	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
AN/SG-53 Radar Set	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Radio Signal Processing Equipment	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
TK 122 Digital Computer	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mk 68 System Alignment	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mk 42 Mod 1 2"/34 Gun Mount	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

•In review, no data assigned.
•Proposed SAPPs.

Key: X = Class "B" Overhaul
T = Turnaround Item
V = Perform System Alignment
O = Specific Repairs in accordance with Material Condition Report
P = Specific Repair, No Class "B" Overhaul
N = Not Installed or No Documentation of Accomplishment
C = Class "C" Overhaul

*In review, no data assigned.
**Proposed SAPPs.

Key: X = Class "B" Overhaul
T = Turnaround Item
V = Perform System Alignment
O = Specific Repair in accordance with Material Condition Report
P = Specific Repair, No Class "B" Overhaul
N = Not Installed or No Documentation of Accomplishment
C = Class "C" Overhaul

Table 2-4. SHIPS USED IN MAINTENANCE DATA COMPARISON

Hull Number	End of Overhaul (Year/Month/Day)	Start First Deployment (Year/Month/Day)	Number of Days in Period
Baseline Ships			
1052	72/11/28	74/10/01	671
1052A	76/11/05	77/08/07	274
1053	74/10/18	75/07/31	285
1054	75/04/17	75/11/11	207
1055	73/09/26	74/06/30	276
1056	74/07/01	76/04/15	652
1057	74/04/22	74/09/30	160
1058	74/07/19	75/01/24	188
1059	76/03/15	76/09/02	170
1060	74/03/29	75/01/03	279
1062	76/03/30	77/01/03	278
1063	77/02/21	78/03/05	376
1065	76/11/05	78/01/08	428
1066	75/02/05	75/10/14	250
1067	75/03/14	75/10/16	215
1068	76/12/01	77/07/01	211
1071	77/01/27	77/11/02	278
1072	76/03/29	77/01/15	291
1075	76/06/20	77/01/31	224
1077	75/05/15	76/02/11	271
1078	77/03/10	79/03/13*	732
1079	76/12/01	77/06/27	207
1081	77/05/09	78/03/31	325
DDEOC Ships			
1057	78/07/12	79/01/31*	203
1060	78/07/07	79/01/31*	208
1061	77/08/26	78/06/29	306
1070	77/11/21	79/01/31*	436
1073	77/12/23	79/01/24	396
1074	77/08/10	78/06/24	316
1076	78/06/21	79/01/31*	224
1080	77/11/01	78/10/01	333
1082	78/05/10	78/10/01	143
1083	78/10/18	79/01/31*	105
1084	78/07/20	79/01/31*	195
1085	78/06/15	79/01/16	214
1086	78/05/12	79/01/31*	264
1089	78/10/07	79/01/31*	116
*Data period ended before first deployment.			

Table 2-5. COMPONENTS INCLUDED IN MDS ANALYSIS OF FF-1052 GUN WEAPONS SYSTEMS	
Equipment Identification Code	Gun Weapon System Equipments
G12M	AN/SPG-53(A) Radar Set
G11K	Mk 68 Gun Director Mod 3
G17A	Mk 47 Computer, Mods 10, 11
G197	Mk 16 Stable Element
G1VE	FC Switchboard, Mk 14 Mod 13
GB19	5"/54 Caliber Gun Mount Mk 42 Mod 9

The results of this comparison specifically relating to gun weapon systems is summarized in Table 2-6, which illustrates various measurements of material condition in terms of a daily rate of occurrence. The table shows that many DDEOC values are significantly* lower than baseline values. Significant improvements were seen for the Mk 47 computer in failure rate, reduced capability labor actions, total labor actions, ship's force, and total man-hours. Significant improvements were also noted in many areas for other equipments such as the Mk 68 Director, the AN/SPG-53(A) Radar Set, and the gun mount. Of particular note is that every equipment analyzed in the gun fire control system showed significantly reduced total labor actions. However, the parts costs and requisition rates are consistently higher for the DDEOC ships (the only exception being parts costs for the director).

The increase in part-usage rate is very likely the result of the Equipment Maintenance Related Material (EMRM) Program. This program began in 1977 and was designed to increase the ships' spare parts budgets. A study by the Center for Naval Analyses** shows that the dollars spent on parts increased over 70 percent when ships entered the EMRM program.

On the whole the gun weapons system seems to have benefited from the DDEOC Program. Of a possible 52 material condition measurements taken on the four different gun weapons system equipments, 42 measurements showed improvement. Of these 42, 13 were significantly better. Only one category, the parts requisitions for the gun mount, showed a significantly higher rate than was shown for the pre-BOH ships. However, there has been a consistent increase in the numbers of parts requisitions and dollars expended for parts in DDEOC over pre-DDEOC. The effect of the EMRM Program on non-DDEOC

*Statistical significance is determined non-parametrically as described in Appendix B.

**Center for Naval Analyses, *Surface Ship Maintenance and Supply Study*, Stan Horowitz, et al., CNS 1111, 27 October 1978.

Table 2-6.

PRIME EQUIPMENT		FIRST NONDEPLOYED PERIOD AFTER OVERHAUL												07/05/79	
REPORT END DATE		COMPARISON OF UDEC AND BASELINE STATISTICS USING MANN-WHITNEY U TEST*													
EIC SET	SHIP	ALL JCNS		LABOR ACTIONS				DEFERALS				MANHOURS		PARTS	
		OPER	RED.CAP	FAIL	OTHER	TOTAL	ALL	OUT	ASST	SF	IN	TOTAL	SCOUT	REQUISITIONS	
6819															
AVG BASELINE		0.0227	0.0095	0.0110	0.0158	0.0590	0.0310	0.0088	0.3925	0.4323	0.0248	26.5918	0.1254		
AVG UDEC		0.0175	0.0153	0.0076	0.0127	0.0532	0.0224	0.0090	0.2470	0.0723	0.3193	30.6763	0.1789		
AVG Z VALUE		0.2596	0.2596	0.0973	0.6003	0.3245	0.0649	0.3732	1.0222	1.4278	1.6549	-1.1033	-1.9145		
LEVEL OF SIG										+	95				
611K															
AVG BASELINE		0.0042	0.0048	0.0016	0.0025	0.0132	0.0070	0.0030	0.0880	0.0431	0.1111	9.6957	0.0168		
AVG UDEC		0.0017	0.0043	0.0010	0.0004	0.0074	0.0038	0.0014	0.1055	0.0148	0.1203	0.8391	0.0173		
AVG Z VALUE		1.2006	0.8595	0.0814	1.9145	2.0119	1.5251	1.0708	1.7523	1.6204	1.7847	0.4543	-0.4867		
LEVEL OF SIG					+	95	+	90	+	95	+	95			
612M															
AVG BASELINE		0.0107	0.0115	0.0035	0.0013	0.0270	0.0264	0.0014	0.1203	0.0000	0.1203	15.8294	0.0726		
AVG UDEC		0.0052	0.0072	0.0037	0.0010	0.0171	0.0030	0.0002	0.1276	0.0259	0.1534	46.3908	0.0821		
AVG Z VALUE		1.0384	1.2331	-0.0324	0.4381	1.3142	0.9735	0.3841	0.3894	-1.0708	0.0649	-0.2758	-0.3083		
LEVEL OF SIG						+	93								
617A															
AVG BASELINE		0.0096	0.0112	0.0026	0.0008	0.0242	0.0364	0.0017	0.1041	0.0031	0.1073	6.3762	0.0425		
AVG UDEC		0.0063	0.0026	0.0007	0.0002	0.0098	0.0224	0.0007	0.1458	0.0002	0.1520	49.9232	0.0544		
AVG Z VALUE		0.2596	3.0827	1.4225	0.7950	2.3850	0.5248	0.0614	1.7847	0.0777	1.6874	-0.4216	-0.6165		
LEVEL OF SIG			+	90		+	97.5		+	95	+	95			

*ALL STATISTICS ARE DAILY RATES.

ships should be studied to confirm that this increase in parts usage is not the result of the DDEOC maintenance strategy. In addition, the effects of OrdAlts and various technical assists and availabilities conducted by GWSRP should be investigated in order to validate the above results.

These conclusions apply only to the first operational period after overhaul. It is expected that the effect of the DDEOC Program on the gun weapons systems will be more noticeable as the period of comparison extends further into the operating cycle.

It is recommended that monitoring of MDS data on DDEOC ships be continued in order to build a data base from which conclusions can be drawn concerning the effect of the DDEOC Program. The results of this continued monitoring should be reported periodically, and efforts to refine the indicators of material condition should be continued. It is also recommended that the indirect measures of material condition be validated by comparing indirect assessments of condition with:

- Independent observations made by experienced personnel
- Assessments made from a study of INSURV reports
- Monitoring of CASREP data

2.3 PROCEDURES FOR UPDATING BASELINE OVERHAUL REPAIR REQUIREMENTS FOR THE GUN WEAPON SYSTEM

Our analysis of the BOH repair requirements addressed the requirement to update existing BOH repair requirements and to develop procedures by which the GWSRP could regularly contribute to the development and update of BOH repair requirements. This portion of the analysis was contingent to a larger degree on (1) the results of the analysis of existing BOH repair requirements and (2) the existence of DDEOC Program development and update procedures. The results of the analysis conducted by ARINC Research support the GWSRP's continuing review of and participation in the development of gun weapon system BOH repair requirements. It is in the interest of both programs that the gun weapon system management and engineering experts provide continuing technical support to validate the requirements. Investigation disclosed no specific BOH update procedures. This discovery led to the development of procedures for updating BOH repair requirements.

2.3.1 Recommended Update Procedures

The procedures recommended for use between the programs resulted from analysis of the existing management policies used by both programs. These update procedures formalize actions that are in some cases recognized as the standard operating procedures within either program. The procedures should be formalized to make each program aware of the other's standard operating procedures. These procedures could be used throughout the various codes sharing mutual interest in the DDEOC Program with minimal

changes. The following paragraphs describe the recommended procedure for updating BOH requirements for gun weapon systems:

- NAVSEA-931X produces original BOH requirements for each class of ships in the DDEOC Program. These "Repair Requirements for BOH" include necessary repairs to ensure that the ship achieves the minimum acceptable material condition.
- NAVSEA-62YGB reviews gun weapon system BOH requirements that apply to the Gun Weapon System Replacement Program (GWSRP) to determine if the specified requirements have deficiencies or excesses that would adversely affect the maintenance of a minimum acceptable material condition policy.
- Analytical data are identified to support recommended BOH requirement changes.
 - These data could be based on results of completed BOHs, funding limitations or allocations, system failure rate, etc.
 - Supporting data should provide documented engineering data on known projected program requirements that were developed after the original BOH requirement had been written.
- Analytical inputs are solicited from cognizant technical field activities. This process should include the submission of actual engineering data with supportive written comments. If the BOH update has been established at the SEASYSKOM level, the cognizant field activities should be provided an opportunity to comment on the final report to be forwarded from the SEASYSKOM level.
- Comments from the field are particularly important when the proposed BOH requirement update involves a gun weapon system that has been in active Fleet service for a considerable period of time, e.g., 5"/54 Caliber Gun Mount Mk 42 Mod 9. Documentation of the accrued engineering experience and corresponding maintenance policy requirements should be included as justification for the BOH requirement update.
- For new gun weapon systems or recent configuration changes that are known to be future GWSRP requirements, the analysis would have to be based on anticipated maintenance experience (as developed in a maintenance engineering analysis) versus documented maintenance experience.
- After NAVSEA-62YGB has received the technical inputs from the cognizant technical activities, a final updated BOH requirement is developed. This BOH requirement is submitted in the detailed planning form (DDEOC Repair Requirements for BOH Planning Form) used by NAVSEA-931X to develop the initial BOH requirements. Figure 2-2 presents a sample of the BOH planning form.
- Final updated BOH requirements are submitted directly to NAVSEA-931X with information copies to the contributing technical field activities.

Ship Class _____

1. SWBS _____	2. DATE _____ MO. DAY YR.
3. SYSTEM _____	4. TASK NO. _____
5. EQUIPMENT _____	6. QTY. PER SHIP _____

7. TASK DESCRIPTION _____

8. SPECIAL CONSIDERATIONS/REMARKS _____

9. JUSTIFICATION/RATIONALE _____

Figure 2-2. DDEOC REPAIR REQUIREMENTS FOR BOH PLANNING FORM

- Upon receipt of the recommended update to the BOH requirements, NAVSEA-931X evaluates the recommendation. The evaluation should result in a recommendation to either (1) incorporate the update in its entirety or some portion of the recommended change, or (2) keep the original BOH requirement without advocating change. The final decision made by NAVSEA-931X is submitted to NAVSEA-931 with an information copy to NAVSEA-62YGB.
- NAVSEA-931 makes the final decision on which action would be taken for those BOH requirements recommended for update.

Figure 2-3 depicts these procedures.

2.3.2 Integration Action

The implementation of these recommended procedures is initially dependent upon the joint agreement by NAVSEA-931 and NAVSEA-62YGB. This agreement will provide the impetus to bring about the closer integration of the GWSRP and DDEOC Program. Integration action is within the current authority and capability of both programs. The stated responsibilities encompass functions already provided for producing the finished product -- the optimum gun weapon system repair requirements for BOH. These procedures can be implemented by the internal assignment of responsibilities and points of contact to ensure the channels of communication for this mutual interest area remain dynamic and open.

2.4 CONCLUSIONS AND RECOMMENDATIONS REGARDING BASELINE OVERHAUL REPAIR REQUIREMENTS FOR THE GUN WEAPON SYSTEMS

From the analyses of BOH repair requirements for gun weapon systems, we developed recommendations for improvements and integration procedures for these repair requirements. Common program action will be required to implement the recommended procedures and to ensure they remain in effect during the BOHs of the DDEOC Program.

2.4.1 Conclusions

The following conclusions resulted from the study:

- Those repair requirements for baseline overhaul of gun weapon systems that have been performed are in accord with DDEOC Program specifications. There have been no significant deviations from class BOH repair requirements in the TYCOMs' overhaul planning process.
- The emphasis placed on regular and baseline overhauls under the DDEOC philosophy requires overhaul requirements to be comprehensive and accurate. GWSRP's periodic review of BOH requirements for gun weapon systems during BOH can ensure their accuracy and responsiveness to Fleet needs.

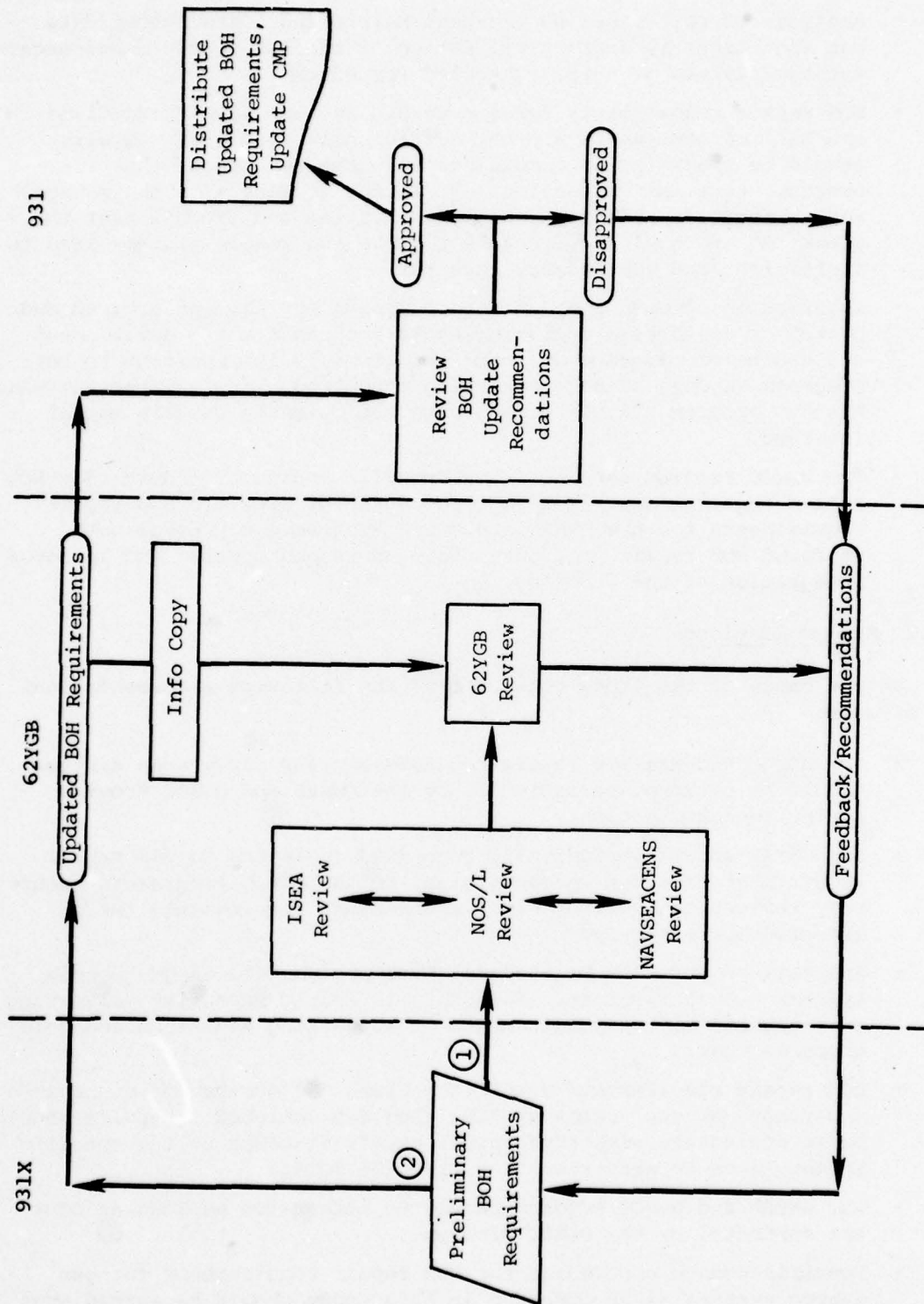


Figure 2-3. BOH REQUIREMENTS UPDATE PROCEDURE

- Analysis of post-baseline overhaul Maintenance Data System data can significantly support validation of the BOH repair requirements for the classes of ships scheduled for BOH.
- BOH repair requirements for gun weapon systems specifying Class "B" overhaul of equipments are not sufficiently specific. Repairs should be specified in accordance with the results of the pre-overhaul test and inspection. It is the consensus of the management activities concerned (GWSRP activities and TYCOMs) that the Class "B" overhaul requirements for the gun weapon systems lead to inefficient and unnecessary repairs.
- Interaction between the Gun Weapon System Replacement Program and Destroyer Engineered Operating Cycle Program for the development and update of baseline overhaul requirements is important to both programs as long as BOHs are being conducted. It is important that the two program offices communicate periodically on this mutual interest.
- The DDEOC Program does not have specific update procedures for BOH repair requirements. The implementation of specific BOH repair requirements for the GWSRP and DDEOC Program can provide both improved BOH repair procedures for gun weapon systems and improved integration of the programs.

2.4.2 Recommendations

On the basis of the study conclusions, the following recommendations are offered:

- The DDEOC Program BOH repair requirements for gun weapon systems should be reviewed periodically by the GWSRP and DDEOC Program acting in coordination.
- The GWSRP should periodically recommend revisions to BOH repair requirements for gun weapon systems to the DDEOC Program to ensure they reflect the current Fleet maintenance requirements for an extended operating cycle.
- Analysis of post-BOH Maintenance Data System data on gun weapon systems should continue. The analysis should emphasize validating existing BOH repair requirements or supporting additions and deletions to them.
- BOH repair requirements specifying Class "B" overhauls on specific equipments of gun weapon systems should be deleted. Repairs should be in accordance with a technical repair standard or the specific item-by-item repairs resulting from the POT&I.
- The GWSRP and DDEOC Program should be integrated as long as BOHs are conducted by the DDEOC Program.
- Specific update procedures for BOH repair requirements for gun weapon systems as recommended in this study should be agreed upon and implemented by the GWSRP and DDEOC Program managers.

CHAPTER THREE

GWSRP AND DDEOC PROGRAM MANAGEMENT INFORMATION SYSTEMS DATA EXCHANGE

3.1 INTRODUCTION

Both the GWSRP and DDEOC Program use computer-assisted management programs for timely evaluation of data necessary to the decision making processes of their respective programs. The computerized system used by the GWSRP is named the GWSRP Management Information System (MIS). The system used by the DDEOC Program is called the Repair Maintenance Management System (RMMS). Both are used by the respective program managers to track key elements of their programs and are maintained by subordinate activities. The GWSRP MIS is managed by the Surface Weapons Systems Maintenance Branch at NOS Indian Head in conjunction with Weapons Quality Evaluation Center (WQEC), Naval Weapons Station, Concord. WQEC is responsible for the maintenance of the necessary data processing services. PERA(CRUDES) is responsible for the maintenance of the DDEOC Program's RMMS. This is accomplished in conjunction with the Defense Industrial Supply Center (DISC), Philadelphia, which provides RMMS data processing services. [RMMS is classed as an MIS throughout this study in the interest of clarity. The RMMS provides management information pertaining only to the scheduling of Class Maintenance Plan (CMP) items. It does not now provide management information supporting any of the many other DDEOC Program management functions. The term "MIS" is applied to both data bases in the generic sense of providing program management information support at any level.]

The information provided from both systems is used for differing program objectives which at first observation would seem incompatible. The GWSRP MIS supports a wide variety of management data specifically aimed at GWSRP equipments and systems; the DDEOC Program's RMMS has a much broader equipment base addressing all major shipboard systems. This difference should not inhibit data exchange. It means only that a portion of the systems included in the RMMS would be affected by any exchange. The fact that both systems affect the maintenance requirements and schedules of similar equipments compensates for the relative differences in their basic objectives. This analysis has been conducted to provide information relative to recommended exchanges of data and software between the two systems and recommended procedures by which to implement the exchange.

3.2 GWSRP AND DDEOC PROGRAM DATA EXCHANGE ANALYSIS

Analysis of the GWSRP's Management Information System and the DDEOC Program's Repair Maintenance Management System concentrated on their configurations and data bases, their similarities, differences, and overall potential for data exchange. Our purpose was to ascertain that there were data that could be exchanged. When we determined that useful data could be exchanged we developed procedures recommended for accomplishing the exchange. This report of the analysis is broken into two parts -- descriptions of the GWSRP MIS and the DDEOC Program RMMS.

3.2.1 GWSRP Management Information System Description

The GWSRP Management Information System provides various reports that are used to evaluate those gun weapon systems that require overhaul or replacement. The data are taken primarily from the results of the material condition reviews and are combined with data from other ordnance and ship reporting status systems. The MIS reports are used by the program managers to determine and establish priorities for overhaul candidates, determine additional inspection requirements, and monitor GWSRP operations.

The GWSRP MIS provides the following reports:

- Fleet Report on Gun Systems (FROGS) Annual
- Fleet Report on Gun Systems (FROGS) Quarterly
- Equipment Condition Report (ECR)
- Material Condition Review (MCR) Status Report
- Overhaul Replacement List (ORL)
- Year-End Report
- Equipment Installation Summary
- Delinquent MCR Status
- System Replacement Summary
- System/Component Replacement

Examples of these reports are contained in Appendix C. Descriptions of the reports follow.

- Annual Fleet Report on Gun Systems (FROGS) - The Annual FROGS is a comprehensive list of available data on all gun weapons systems installed on active and NRF ships in each surface fleet, sequenced by TYCOM, ship, and configuration accounting number (CAN).
- Quarterly FROGS Report - The Quarterly FROGS is generated using the same format and data elements as the Annual FROGS, but lists only ships on which compiled information has been updated.
- Quarterly Equipment Condition Report (ECR) - The ECR lists results from all MCR summary reports received on GWSRP equipments. This report is sequenced by TYCOM, equipment replacement code (ERC) in descending sequence, ship, and CAN.

- Semi-Annual Material Condition Review Status - The MCR Status Report lists equipments that have either (1) not had an MCR or (2) had an MCR more than three years previously and are on a ship scheduled for overhaul at a yard within the following three years.
- Overhaul Replacement List (ORL) - The ORL is a prioritized list of GWSRP equipments most likely in need of an overhaul, ranked on the basis of several weighted parameters. It is a four-part statistical analysis of gun systems and fire control equipment containing (1) the actual reported parameter values, (2) ranked position of those values against like equipments, (3) all equipments listed in the sequence of the ORL, and (4) ships ranked by the average index of the onboard equipments. The final statistical value reached is called the overhaul replacement index (ORI).
- Year-End Report - This report summarizes all MCR results completed during the previous calendar year for each ship, sequenced by TYCOM, ship, and CAN.
- Equipment Replacement Summary - This quarterly report lists all equipments and their serial numbers changed or added to ships.
- Delinquent MCR Status - This report lists equipments that have either not been inspected or, for those ships that will be entering overhaul during the upcoming year, were last inspected more than one year before the date of the report.
- System Replacement Summary - This report summarizes by system those equipments and components that are in need of replacement as reported through the MCR Program. It is used to index the System/Component Replacement Report as well as compare the material condition of like equipments.
- System/Component Replacement - This report provides further information regarding the condition reported for each equipment and ship. It permits comparisons of the relative conditions of equipments on different ships. The report contains the major comments of the MCR team on the reported systems and components.

The first seven reports are used throughout the GWSRP. The last three reports are used exclusively by the NAVSEA program managers.

3.2.2 DDEOC Program RMMS Description

The RMMS was developed from the necessity for the DDEOC Program to maintain a computerized repair scheduling program. Fundamental changes in the way the Navy manages the maintenance of its destroyer fleet occurred as a result of the development of the DDEOC Program. One of the most significant changes was the CMP.

The CMP identifies the maintenance and refurbishment actions required for a ship class. It is generally applicable to all ships of the class and it can be tailored to specific ships within the class. Maintenance scenarios have been developed to provide overviews of the class maintenance requirements resulting from maintenance plan development efforts. A

maintenance scenario is a schedule for maintenance of a notional ship of the class. It is based on the engineered maintenance requirements of the CMP and on knowledge of a notional ship's operating profile.

A maintenance cycle scenario is developed by combining the maintenance requirements of the CMP with a notional ship class operating scenario. Each maintenance requirement identified in the CMP is reviewed and a decision is made regarding the best time for its accomplishment during the operating cycle. This decision considers both the desired frequency of accomplishment and the various available periods for performing maintenance during the cycle. The maintenance scenario portrays the anticipated maintenance load at the IMA and depot levels for a typical ship of the class throughout its operation.

The RMMS was developed to properly schedule and control the periodic maintenance items within the CMP. RMMS contains the CMP maintenance actions and schedules, including the status of tasks scheduled for earlier intermediate maintenance activity availabilities (IMAVs), selected restricted availabilities (SRAs), or regular overhauls (ROHs). The completion status will be provided to PERA, via the existing Maintenance and Material Management (3-M) System. PERA(CRUDES) will use this completion status to update RMMS and accurately determine the work items required for the next availability. The feedback of completion status from the last availability must be received in time to define the next work package before the start of the follow-on availability.

The RMMS is completely compatible with the ship's Current Ship's Maintenance Project (CSMP), the Intermediate Maintenance Activity (IMA) Management System (IMMS), and the automated Ship Alteration and Repair Plan (SARP). Within the DDEOC Program it is used as an additional source for identification of repair work items as in the aforementioned processes.

The RMMS provides the following reports:

- Periodic Maintenance Schedule. A periodic report for each ship identifying the maintenance requirements due during the report period.
- Inventory of Periodic Maintenance. An annual listing for each ship of all maintenance requirements applicable to that ship. It is divided into two parts, scheduled requirements and situation requirements.

These reports are used primarily by the forces afloat. The TYCOM and squadron commanders use the RMMS reports to identify the maintenance due for performance on their ships.

3.3 INTERFACE POTENTIAL

The exchange of data between the GWSRP and DDEOC Program on a real-time basis using existing data systems was analyzed. The GWSRP MIS and

the RMMS provide computerized data reports that facilitate the ability of both program offices to track various aspects of their programs. The information these data bases provide enables the program managers to make more accurate and timely decisions. For the GWSRP the material condition reviews are the major programs tracked. These inspections are the backbone of the GWSRP because they determine the systems that will be brought in for overhaul at NOS Louisville. For the DDEOC Program CMP items scheduled during the engineered operating cycle are the major ones tracked. These items are of considerable importance to the DDEOC Program because engineering analysis determined they must be accomplished to meet DDEOC Program objectives. The sharing of information can increase both programs' data bases and support subsequent decision making.

To properly evaluate the interface potential, it was necessary to consider the present system's configuration, near-term growth, and long-range plans. The rapid growth of computerized systems to support Navy operation both at sea and ashore creates an environment that dictates planning for ever-increasing utilization of computers. That increasing emphasis should lead to requirements for standardization of hardware and software throughout the Navy. Foresighted planning in consonance with the trend of Navy plans should prevent short-term solutions at the expense of long-range readjustments and alterations. For these reasons this section looks not only at the immediate interface actions that could be coordinated but also at some near-term and long-range considerations that should be addressed in the overall coordination effort.

3.3.1 Common Areas

The data contained in the two systems have elements that are common to both programs. Table 3-1 identifies the types of data available from the various data sources. The data-type categories shown are not all-inclusive but do represent the primary groupings. The table indicates that all reports, with the single exception of the ORL, contain some type of scheduling information. Additionally, nine out of 12 of the reports have some degree of configuration information. The configuration data include the identification of system, equipments, or components by ship and an identification code such as EIC, APL, or serial number. The material condition data represented in the programs' data relate primarily to published results of the GWSRP Material Condition Reviews (MCRs) and other measurement standards assigned to the equipment to indicate level of repairs required and their priority. Although most of these reports contain basic information common to the others, the manner in which they are reported is different. The GWSRP assigns material condition level (MCL) codes at both the component and system levels. These indicate the level of repair required to return the equipment to an "overhauled" condition. Those levels are defined in the following statements:

DEFINITION OF MCLs

Level 1 - No repairs or replacement required. No adverse conditions were identified.

Table 3-1. SOURCE OF DATA BY TYPE			
Data Source	Data Type		
	Configuration	Material Condition	Scheduling
GWSRP			
Fleet Report on Guns - Annual	X	X	X
Fleet Report on Guns - Quarterly	X	X	X
Equipment Condition Report	X	X	X
Material Condition Review	X	X	X
Overhaul Replacement List		X	
Year-End Report		X	X
Equipment Replacement Summary	X	X	X
Delinquent MCR Status	X	X	X
System/Component Replacement	X	X	X
DDEOC			
Periodic Maintenance Schedule	X		X
Inventory of Periodic Maintenance	X		X

Level 2 - The adverse conditions identified are within the capabilities of the ship's force to correct. All Level 2 conditions are to be explained on Summary Sheet 2.

Level 3 - The correction of adverse conditions identified require personnel expertise, material, or specialized support equipment from an IMA or shipboard. All Level 3 conditions are to be explained on Summary Sheet 2 including comments on the severity of condition.

Level 4 - The component cannot be repaired and is identified as being deteriorated to that point where only replacement of the component will correct the conditions found. The component that requires replacement will be detailed by serial number, stock number, APL, Mk, Mod and Nomenclature. A condition level of 4 does not necessarily indicate that the component has failed or broken but in the opinion of the review team, the component has deteriorated to a point where failure is near imminent (less than one year).

DEFINITION OF SYSTEM MCLs

Level 1 - No repairs, replacement required

Level 2 - Ship's force capable of all repairs

Level 3 - IMA assistance required (RAV)

Level 4 - Yard period required (ROH)

The system MCL will be based on the component MCLs reported by the review team. The system MCL will indicate the level of maintenance (ship's force, IMA, yard) required to correct the conditions. Example: If all components or the entire system can be replaced by the IMA, the system MCL would be level 3 even if the total system requires replacement. The integration of these two MCLs affects the GWSRP recommended level and priority of repair.

Within the DDEOC Program the RMMS has standard CMP items whose periodicities have been established and recorded. The RMMS indicates the level of repair (ML) and the priority indicator (PRI). The level of repair is pre-determined for CMP items and thus is relatively fixed. The differing approaches of assigning level of repair and priority of repair could possibly lead to assignment of the same work twice. Although that would probably be the extreme, the integration of RMMS and DDEOC information would improve the TYCOM's ability to assign work in the proper facility with the requisite priority.

Common data elements reported in the two data bases are as follows:

- Regular Overhaul Date
- Equipment Nomenclature
- Mark-Mod of Equipment
- Quantity
- Level of Maintenance Required
- Last Accomplished
- Next Due Date

Some of these data groupings are common only in that similar types of information are provided, but the referenced tasks or maintenance requirements may differ. Generally the DDEOC Program RMMS refers the aforementioned data to very specific maintenance requirements. The GWSRP MIS refers that data more specifically to the outcome of inspections that will be utilized to develop maintenance requirements. Although the data elements are essentially common, the basic utilization of those data as referred to the task requirement is not entirely common. The data elements shown above have enough similarity so they do not need to be exchanged.

3.3.2 Unique Report Elements

The common data elements were discussed to provide a basis of similarity in data base content. The same approach will be taken to discuss those elements that are dissimilar. The basis of this dissimilarity lies in the following two reasons: (1) the GWSRP is primarily oriented toward detailed support of gun weapon systems, and (2) the DDEOC Program RMMS tracks the predetermined maintenance requirements listed in the CMPs. In summary, the basic difference in purpose is that the GWSRP MIS can be described as a reactive system dedicated to gathering information to determine maintenance requirements whereas the DDEOC Program's RMMS is a tracking system that gathers information to determine accomplishment of previously engineered maintenance requirements.

Both systems have distinct advantages and disadvantages. Each system appears to include data elements that would be of interest to the other. The data elements that are unique to each program are shown in Table 3-2.

Table 3-2. UNIQUE DATA ELEMENTS OF TWO MANAGEMENT INFORMATION SYSTEMS	
Gun Weapon System Replacement Program Management Information System	Destroyer Engineered Operating Cycle Repair Maintenance Management System
Ship Home Port	APL/CID
Ship Status (Active/NRF)	Material Requirement Card/Technical Repair Standards
Ship Strike Date	Drydocking Requirements
Equipment Serial Numbers	Rotatable Pool Applicability
Equipment Shipboard Location	Master Job Catalog Number and Lot Sequence Number
Equipment Installation Date	Number of Times Periodicity is Overdue
Equipment Replacement Code	
Material Condition Level	
Material Condition Review Inspection Date	
Overhaul Yard	
All Aspects of Overhaul Replace- ment List Report	

The list of dissimilar data elements is larger than the list of common elements. This is due largely to the aforementioned reasons associated with the different orientations of the programs. There are elements of each data base that are unique but could provide useful information to the

other program. This information would aid the program managers in their current decision-making processes. From the above lists there are many elements that could be exchanged. The GWSRP information concerning the results of MCRs becomes increasingly important to the DDEOC Program since the POT&I and MCR have been integrated. Additional information contained in the GWSRP MIS data base concerning configuration of gun weapon systems should be of interest to the DDEOC Program. Conversely, knowledge of the CMP items affecting gun weapon systems should be available to and reviewed by the GWSRP managers. Along this line, the CMP items and corresponding RMMS printouts for SWABs in the 480s and 710s should be reviewed periodically by GWSRP. Other important classes of data that could be simply transferred include:

- Analytical data established in the GWSRP Overhaul Replacement List could be aligned with present RMMS priority indicators and overhaul periodicities.
- GWSRP priorities could be utilized by RMMS to update its priority and maintenance requirement periodicity.
- Scheduling information based on the DDEOC Program's recommended availabilities in the extended overhaul cycle on an individual ship basis should be common data in both programs.

This type of information exchange can greatly assist both programs in the effective scheduling of maintenance requirements during designated availabilities.

At present the TYCOMs are receiving computer-generated work packages based on various inputs, one of which is the CMP item. Work load planning could be enhanced at the TYCOM level by combining information from both MISs. For instance the CMP for the FF-1052 Class states an engineering requirement for Class "B" overhaul of the Mk 47 computer in the Mk 68 Gun Fire Control System every regular overhaul. The results of GWSRP MCRs and other MIS data for each ship should be compiled to confirm, amplify, or negate this requirement. If this information is made available to RMMS before printing out the preliminary SARP, the accuracy of the requirement may be confirmed before TYCOM review. This process would eliminate the requirement for the TYCOM to check each ship MCR against proposed gun weapon system work requirements.

The most critical issues related to the transfer of information are those of cost effectiveness and program priorities. This information that is unique to each program and could be exchanged via information system augmentation is retained by the TYCOMs. Both programs are providing support in myriad fashions to the TYCOMs. The exchange of data between the two programs should enhance their abilities to support the TYCOM for gun weapon systems. The proposed areas of data exchange should achieve this purpose. What must be considered is the net cost of transferring as opposed to the overall benefits it offers for TYCOM support of gun weapon systems. This report presents only subjective recommendations concerning this question because not enough costing data were made available to objectively determine the cost of an exchange. Obviously costs would

differ with the degree of exchange sought between the two information systems. It is envisioned that costs to initiate programming compatibility to accept additional data elements would be the greatest costs. These costs should occur only once. The cost of the actual transfer of data via cards, tapes, etc., should be minimal, as should be the cost of the additional computer central processing unit (CPU) operating time.

The overriding concern resulting from this analysis is that the present configuration and capabilities of the data bases may be such that it may be better to transfer the information via some reporting channel external to the existing system. Given enhanced data base capability with an increased emphasis on analytical programs, a direct interface would probably be extremely beneficial and cost effective. The analysis has concluded that the exchange of certain data could only serve to improve the capabilities and accuracy of both systems. What has not been clearly resolved is the cost/benefit trade-off of implementing such an exchange.

3.4 RECOMMENDED INTEGRATION PROCEDURES

The following procedures should be used for the integration of data between the two computerized systems supporting the GWSRP and DDEOC Program. These procedures describe the actions required to develop and implement an exchange of data between the two systems. These actions can be initiated now or at some later date depending on the priority associated with such action. The cognizant activities that would participate in this exchange are PERA(CRUCES) and WQEC, Concord. They are responsible for the management of the data base of the programs' systems. Due to this assigned responsibility, the data should be exchanged between designated codes within these organizations.

The integration procedures are divided into development and implementation phases.

3.4.1 Development Phase

The plan of action for the development phase should include the following steps:

- PERA(CD) should develop and maintain the Repair Maintenance Management System (RMMS) in accordance with DDEOC Program guidance. WQEC, Concord should develop and maintain the GWSRP MIS in accordance with GWSRP guidance.
- A computerized data base should be formulated by the aforementioned activities on the basis of the data input and output requirements desired by their respective programs.
- Elements of both systems should support the maintenance management of gun weapon systems to differing degrees. The degree of variance in direct support should be established indicating areas of potential information exchange.

- A joint working level meeting between the responsible codes from PERA(CRUDES) and WQEC, NWPSTA, Concord, should be held to establish exact integration potential.
- The meeting should be directed at establishing specific software/data elements to be exchanged.
- Recommended formats for input and output of exchanged data should be developed. A direct magnetic tape transfer of data elements would be preferable to an exchange of entries requiring computer coding. These tapes could be direct compilations of exchange data elements only or complete program dumps including extraneous data. A complete program dump would require the receiving facility to create an edit/sort program to obtain the desired information from the entire tape dump.
- The recommendations resulting from the working level meeting should be forwarded to NAVSEA-931X and NAVSEA-62YG via their respective chains of command for approval. Upon approval from the program managers the following integration procedures are recommended as an initial method of implementing the proposed data exchange.

3.4.2 Implementation Phase

This phase consists of implementing previously agreed-upon principles for transfer of data or software. The following procedures are recommended for data exchange implementation.

- WQEC - Compile exchange data elements, place on transferable input medium (preferably magnetic tape); ship to cognizant PERA(CD) code every month.
- PERA(CD) - Compile exchange data elements, place on transferable input medium (preferably magnetic tape); ship to responsible WQEC code every month.
- WQEC and PERA(CD) - Edit and sort input data and enter them into own data base.
- WQEC and PERA(CD) - Print updated data base for distribution.
- WQEC and PERA(CD) - Maintain contact to ensure that transfer of data is occurring effectively and is up to date with latest program needs.
- WQEC and PERA(CD) - Make provisions for periodic meetings to assess operational and procedural elements of the data exchange integration.

3.5 DATA BASE CONSIDERATIONS

The GWSRP Management Information System and the DDEOC Program RMMS are currently functioning systems supporting very specific objectives of their respective programs. The current advances in computer technology and applications in all phases of Government and civilian management dictate that discussions of the interface of these two systems take into account some

of the broader decisions and policies emanating from Navy-wide programs concerning computer technology. This information provides some insight into ongoing programs and the directions different Naval activities are moving. This information has little effect on near-term coordination efforts between the two information systems but does suggest considerations for long-range planning.

3.5.1 Developmental Programs

There is currently considerable activity in the Navy for upgrading, expanding, and unifying the computer-aided capabilities of both ashore and fleet activities. Computers have been integral elements of the fire control systems of Fleet ships for some time. The Naval Tactical Data System (NTDS) has served the Fleet since the early 1960s by providing real time operational data for reporting, tracking, and engaging surface, subsurface, and air contacts. More recently computers have been installed to assist the ship's navigation and to aid the integrated logistic support capabilities of larger ships such as AS, AR, AD, AFS, CV, LPH, and LHA.

The AN/UYK-5 computer was purchased by the Navy in the mid-sixties to support the shipboard non-tactical system, such as Maintenance and Material Management (3-M) and supply and financial operations. The Shipboard Non-Tactical ADP Program (SNAP) is designed to replace the AN/UYK-5 computer system with state-of-the-art improvements and support the system for 20 years. As part of this overall two-phase program, SNAP II will install a small compatible ADP system on smaller ships (e.g., CGs, DDs, FFs) that are not now equipped for non-tactical data automation. The procurement of both the hardware and software to support SNAP follows recent trends in ADP hardware procurement pioneered by the Air Force and the Defense Logistic Agency. The procurement of new software systems and replacement hardware is based on regulations and management procedures expected to govern shipboard management for the next 15 to 20 years. SNAP I and II together provide the blueprint for future nontactical ADP support for Navy and Marine Corps fleet units. As a result, many of the strategies applied to this program could become mandatory policy throughout the Navy. The coming of nontactical ADP systems on the majority of Navy ships has wide-spread implications concerning maintenance management. Access to maintenance data in real time is foreseeable in the near future. The requirement for major NAVSEA programs to integrate their MISs with these systems is plausible. Management information systems may be required to provide ADP programs compatible not only with shipboard systems but also with other shore-based systems (currently in operation and being developed). Uniformity in programming, data storage, data retrieval, and supporting hardware are all foreseeable elements of a larger scale effort in the near future.

Both the GWSRP and DDEOC Programs have ongoing efforts related to information systems that could affect the interface between these two programs' existing information systems. As each designated management information system support facility [i.e., WQEC and PERA(CD)] changes its capabilities, the interface between the two programs should reflect coordination encompassing the most current capabilities. PERA(CD) now has two

efforts in the development stages -- Integrated Logistic Support (ILS) Management Information System Pilot Program for the DDG-19 overhaul and the Maintenance and Support Monitoring Subsystem (MSMS) for FFG-7 Class -- that could affect integration actions and on-site capabilities.

The ILS Management Information System Pilot Program for the DDG-19 Overhaul as being undertaken by PERA(CD) is described in the following paragraph.

Problems have arisen during past overhaul planning efforts in (1) suitably identifying the pre- and post-overhaul equipment configuration resulting from accomplishment of ShipAlts, (2) expeditiously identifying all ShipAlt material for procurement action, and (3) identifying missing ILS information (e.g., APL numbers, technical manual numbers, MIP numbers) in time to support the accomplishment of ShipAlts during ship overhauls. An ILS MIS is being developed to provide reports to the ILS managers identifying the ship configuration from presently available data sources. Included in this MIS will be data on all weapons systems as contained in the Weapons Systems File (WSF). This file will be updated to reflect the latest changes as brought about by the accomplishment of OrdAlts. This updated information will contain the latest configuration data on the gun weapons systems contained on the DDG-19. PERA(CD) is presently considering expanding the ILS MIS and making it available to all ships both within and outside of PERA(CD) cognizance.

A second PERA(CD) effort is the MSMS. As a subsystem of the FFG-7 Class logistics data system, the MSMS will have the capability to track maintenance and support actions in the Fleet and ashore, aggregate reported maintenance and support action data into usable form, measure and evaluate performance of equipments and support efforts, compare reported performance with predicted performance, determine deficiencies of ILS, and identify required ILS corrective actions. The MSMS will not include implementation of corrective action. The study will result in a recommended system for updating the ILS for FFG-7 Class ships. The recommended system will consist of a method for analyzing feedback information from maintenance activities. The feedback that the MSMS receives from the Fleet will be on-line, real-time data directly from shipboard computer data terminals.

The GWSRP could benefit from either of these two systems as could the DDEOC Program. At this time neither the FFG-7 nor DDG-2 Class is in the DDEOC Program. Although these two systems are being developed to support specific portions of shipboard maintenance philosophies, their implementation could have far-reaching effects. Additional PERA(CD) efforts on RMMS for an automated feedback system have been recommended. This type of programming effort could provide an excellent vehicle for data exchange related to gun weapon systems between the GWSRP and DDEOC Program MISs. Should RMMS develop an automated feedback capability, the incentives for integration of the two MISs would be even greater.

The GWSRP has received considerable input from WQEC concerning the possibility of installing on-line terminals at the major activities supporting the program (i.e., NAVSEACENS, NOS Indian Head, WQEC, etc.). This idea

has not yet received any feasibility study, so it presently exists only as a proposal. Depending on the outcome of this proposal, the GWSRP MIS capability could change dramatically in the near future. The proposed on-line, participative system would be similar to the one originating in the SNAP. Users of the proposed system would have direct input capability and assigned retrieval access to the master CPUs from their on-site input/output devices. The hardware and software procurements could be aligned with various existing systems.

As has been mentioned, developments dictate that the coordination of these two management information systems give consideration to their near-term needs and long-range constraints as relates to developing programs. Evolving technology and the Navy's policies to use the current state of the art should be considered. Given the possibility of expanding Navy-wide demands to integrate existing information with ashore and afloat activities would suggest this coordination effort should consider the long-range effect, if any, of impending programs. The integration of maintenance-oriented information systems, especially those using such standard data sources as 3-M and CASREP, is imminent. It is in the best interests of both of these programs to establish simple integration tasks and procedures initially to ensure that this MIS integration does not conflict with developing Navy-wide programs.

3.5.2 Equipment Considerations

Currently WQEC, NWPSTA Concord, is supported by two primary CPUs, a Honeywell 2200 series, and a Wang PDP-111. PERA(CD) receives its computer hardware support from DISC, which uses an IBM 360-50 for RMMS tasks. The different capabilities and programming requirements of these computers must be considered. Although providing an interface between these information systems and their limited data elements is not a difficult hardware problem, the cost of programming data exchange could result in an unfavorable cost/benefit trade-off. The differing hardware should be taken into account in early discussions.

3.6 CONCLUSIONS AND RECOMMENDATIONS REGARDING GWSRP MIS AND DDEOC RMMS DATA EXCHANGE

As a result of ARINC Research Corporation's analyses of the GWSRP Management Information System and the DDEOC Program Repair Maintenance Management System, we recommend several areas of data exchange between the two information systems and the procedures for accomplishing the exchange.

3.6.1 Conclusions

The following conclusions resulted from the study:

- There are elements of each program's data base that are not currently in the other's. Transfer of configuration, inspection, and scheduling data should provide better comprehensive management information for gun weapon systems.

- The amount of data to be transferred indicates that initial exchange procedures by other than direct computer interface would provide the best cost/benefit relationship.
- There is a favorable environment for change to existing management information systems at PERA(CD); WQEC, NWPSTA Concord; and throughout the Navy. Development and implementation of proposed programs could substantially change the scope of the existing systems and be more favorable to direct integration of the systems.
- The GWSRP and DDEOC Program manager can determine the best time to achieve maximum benefits from integration of the two management information system by periodically conducting joint reviews of their systems.
- The coordination of the effort to exchange data between the management information systems of the two programs requires agreed-upon procedures. The procedures recommended to initiate this coordination can be started whenever the programs conclude the change will provide the optimum cost/benefit returns.

3.6.2 Recommendations

On the basis of the study conclusions, the following recommendations are offered:

- The GWSRP and DDEOC program managers should authorize the direct liaisons of the support activities of their respective management information systems to initiate procedures for transferring elements (configuration, inspection, scheduling) of each system's data base to the other.
- The initial discussions between the GWSRP and DDEOC Program MIS support personnel should resolve which methods of data transfer would provide the greatest cost/benefit relationship.
- The planning of direct coordination of information systems should take into account developing and proposed programs. The proposed changes should facilitate a comprehensive integration with developing programs. The coordination should take place before the proposed programs are implemented.
- NAVSEA-62YGB and 931-X should designate activities to meet periodically for joint management information system reviews. These reviews should result in recommendations for data base integration.
- NAVSEA-62YGB and 931-X should review the recommended procedures on how to initiate coordination between the two management information systems. Agreed-upon procedures should be documented and implemented at that time both programs agree will optimize the cost/benefit returns.

CHAPTER FOUR

GWSRP SUPPORT TO DDEOC PROGRAM SITE TEAMS

4.1 INTRODUCTION

The assessment of shipboard equipments and systems has long been practiced in the Fleet. The Planned Maintenance System (PMS) is the largest Fleet-implemented program ascribing to these practices. The DDEOC Program has established equipment and system assessment requirements in addition to current Fleet practices. The assessment of performance and material condition for designated systems and equipments is the primary objective of the DDEOC Program assessment procedures. DDEOC assessment procedures are not considered to be material inspections for the purpose of ascertaining Fleet readiness or availability. DDEOC site teams have been formed at major DDEOC ship home ports to perform or assist ship's forces in performing DDEOC assessment procedures.

The DDEOC Program has designated ten systems on the FF-1052 Class for the development of procedures for Material Condition Assessment (MCA). These systems are Hull, Mechanical, and Electrical (HM&E) equipments with the single exception of the AN/SQS-35 IVDS. This analysis was conducted to determine the feasibility of integrating GWSRP expertise with that of the DDEOC Program to introduce gun weapon systems into the DDEOC Program's site team and MCA procedure development efforts. The following benefits are sought:

- More comprehensive data for gun weapon system maintenance management
- Increased visibility of DDEOC site team effort through further expansion into combat systems
- More comprehensive shipboard inspection during the designated inspection period

4.2 DDEOC SITE TEAM ORGANIZATION

It is important to this analysis that the DDEOC site team organization be described. This section will trace the development of the site teams from initial site team proposals to their current manning levels and operational procedures.

4.2.1 Site Team Personnel

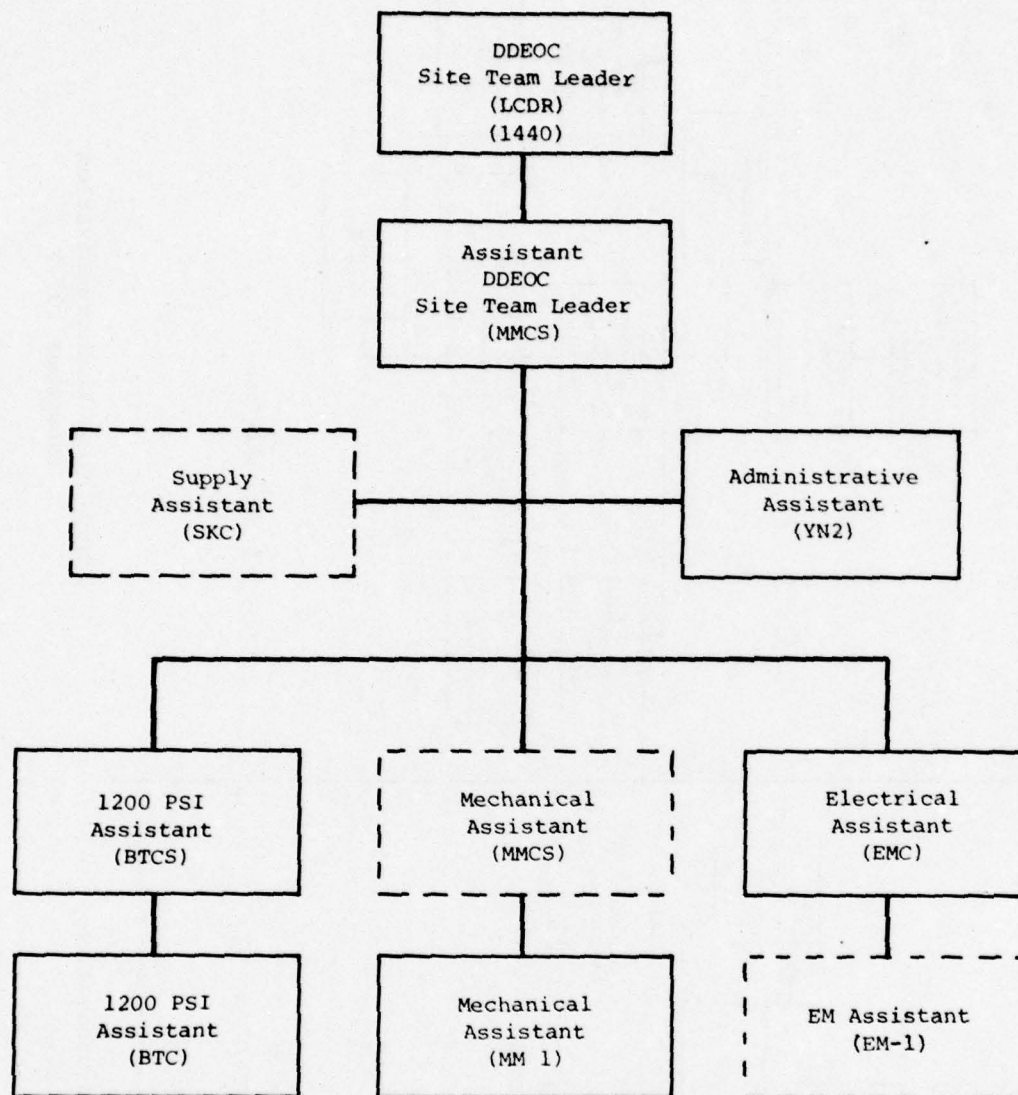
The DDEOC site team receives program and policy direction from the DDEOC site team leader in conjunction with the DDEOC coordinator from the Type Commander's staff and receives technical guidance from the DDEOC Program Office. The team will be led by a naval officer with cruiser or destroyer engineering experience. The nominal organization of a DDEOC site team is shown in Figure 4-1.

This organization depicts a site team leader and six team members. By fiscal year 1980 the organization will be expanded by the addition of three more members for a total composition of ten. As can be seen from Figure 4-1, all the rates are oriented to HM&E. Combat systems experience is not required of any personnel. This was not the original manning nor rates proposed for the site teams. Figure 4-2 depicts the DDEOC site team organization as proposed in the Interim DDEOC Management Plan of February 1977 and the DDEOC Management Plan of November 1977. The development of the organization shows that the site team went from initial manning levels of 11 members to its current manning level of seven members and will have a fiscal year 1980 manning level of 10 members. The first two proposed site team organizations both authorized personnel with combat systems experience. Initially a GMMC (NEC 0981), FT2 (NEC 9535), and ST1 (NEC 0483) were authorized. This authorization was reduced in the November 1977 edition of the DDEOC Management Plan to a FTMC (NEC 1147) and a STG 1 (NEC 0498). Neither the current organization nor the fiscal 1980 organization has billets for combat systems personnel. The billets for combat systems personnel have been eliminated from the initial proposed level of three members. This reduction occurred because the DDEOC Program office wanted to concentrate initial program emphasis in the HM&E area. There exists favorable support in NAVSEA 931X for integrating combat systems into the overall DDEOC site team and MCA procedures effort.

4.2.2 Gun Weapon System Expertise

The fact has been established that the DDEOC site teams have no assigned personnel with gun weapon system experience. The material condition assessments conducted do not presently address gun weapon systems. These two facts indicate that the addition of gun weapon systems to systems and equipments now designated for the DDEOC Program will have to be fostered by the GWSRP. This does not imply that the DDEOC site team program will never support gun weapon or combat systems. It appears that the near-term position of the DDEOC Program is not to include these types of systems, but not exclude the possibilities of bringing them aboard if the proper combinations of resources can be committed towards the effort.

The GWSRP has the technical expertise and the DDEOC has the program authorization. The GWSRP expertise can be drawn from the experts resident at the NAVSEACENS, NOS Louisville, and at NAVSEASYSOM. These activities have the Navy's best engineering expertise in all phases of gun weapon system care -- specialists in life-cycle management techniques to personnel qualified to perform corrective maintenance and complete overhaul of these

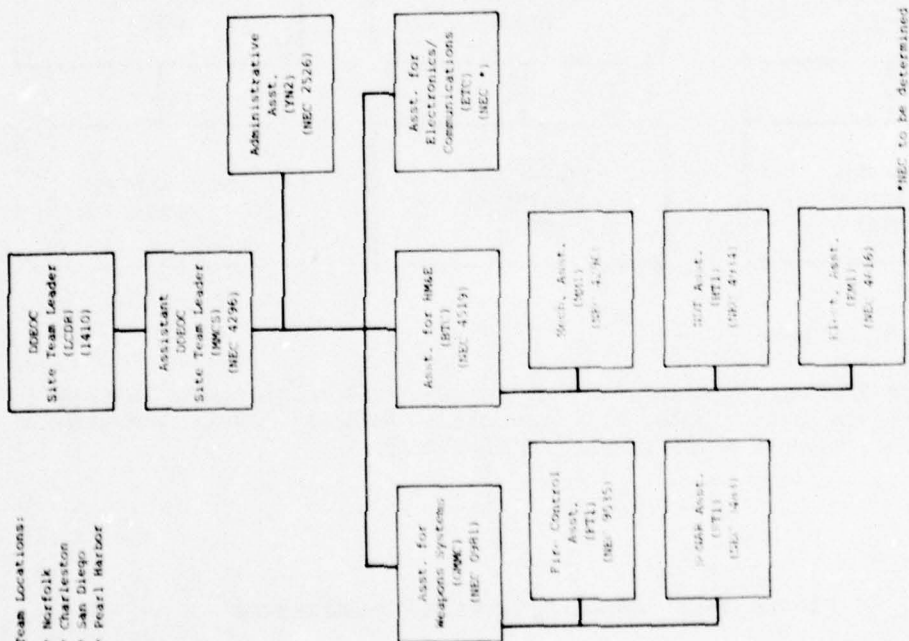


-- = FY 80 billets.

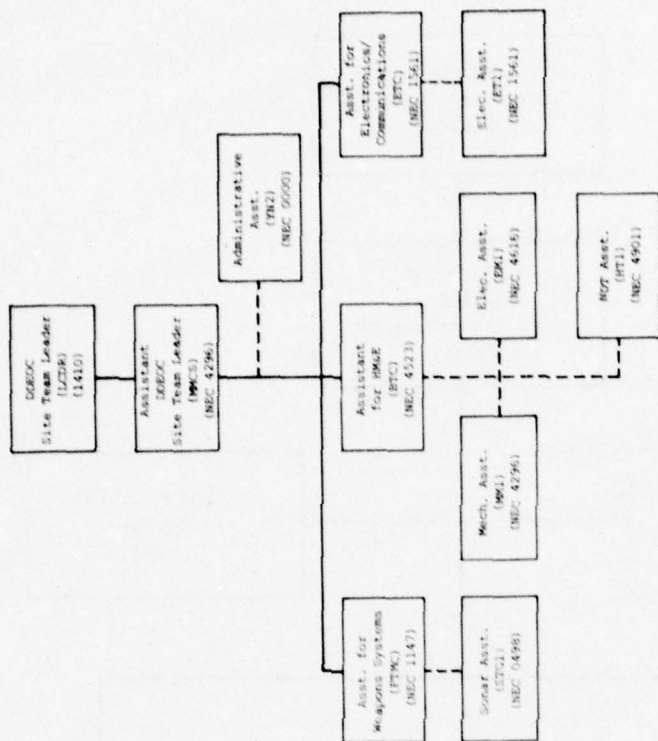
NOTE: Team 2 of approximately the same composition to be formed in FY 80 for each fleet. DDEOC Site Team UICs: Norfolk - 39282, San Diego - 39283, Mayport - 42821, Pearl Harbor 42822

Figure 4-1. DDEOC SITE TEAM ORGANIZATION

Team Locations:
 • Norfolk
 • Charleston
 • San Diego
 • Pearl Harbor



DDEOC Site Team Organization
 (February 1972)



----- FY 79 billets

DDEOC Site Team Organization
 (November 1977)

Figure 4-2. PROPOSED DDEOC SITE TEAM ORGANIZATIONS

systems. Coupling the GWSRP expertise with the DDEOC Program would permit the collection of data to improve the maintenance management of gun weapon systems. The GWSRP expertise can be utilized in myriad ways from direct involvement in the shipboard inspections to analysis of generated data.

4.2.3 Inspection Procedures

The purpose of the site team visits is to obtain assessment data related to specific equipments. The DDEOC assessment procedures will be used during the site team visits to each ship so that the visit will not constitute a material inspection of the ship.

The procedures followed in the DDEOC site team visits can be separated into three phases: (1) pre-visit arrangements, (2) ship visit, and (3) post-visit data analysis. A member of the team usually makes the pre-visit arrangements at least a week in advance of the visit. Those arrangements include the following:

- Review assessment procedures to be conducted
- Identify any assistance required by the site team from the ship's force
- Identify shipboard problems that may affect the conduct of assessment procedures
- Make arrangements for special visit requirements that the ship's force desires (e.g., preassessment brief, critique at the end of the visit, assistance with specific equipments, etc.)

Once these and any other items affecting the forthcoming visit have been covered, and any problems have been identified and solved, the site team will visit the ship and assess the equipment. During the assessment, conditions may be encountered that indicate that actions should be initiated by the ship to ensure continued satisfactory operation of the equipment. When these conditions are noted during the site team visit, they will be explained to the ship's personnel and again during the post-inspection brief held at the end of the visit. The site team will adhere to MCA procedures, yet at the same time will provide the ship with any information pertinent to proper equipment operations in a factual manner not designed to put the ship "on report".

The third phase of the DDEOC site team visit is the post-visit data analysis. This consists of the DDEOC Program Office analyzing the recorded data. Additional items may also be discovered during this subsequent analysis. The DDEOC Program Office will forward a report of the site team visit to the ship when it has completely evaluated the data, listing conditions noted during the visit. Included in this report may be recommendations for corrective maintenance to be accomplished by ship's force, recommendations for preventive maintenance actions that would be advantageous to perform, and recommendations for Intermediate Maintenance Activity (IMA) or depot-level maintenance for the ship to enter into the 3-M System. These reports are not to be considered as results of inspections but are designed to provide the ship's force with information to help it satisfactorily maintain equipment material condition.

The integration of GWSRP expertise into the site teams would occur primarily in phases two and three. These phases are involved with the inspection procedures and data analysis. Phase one is largely concerned with administrative planning by a site team member. Assuming that GWSRP expertise can be provided without the addition of another member to the site team, the implementation of phase one would be accomplished in accordance with prescribed DDEOC Program Office policy, without requiring external assistance.

A quarterly visit schedule is developed by each site team leader and forwarded to the DDEOC Program Office at least one month before the beginning of each quarter. At least two weeks before the scheduled date of a site team visit, the DDEOC Program Office forwards to the site team a list of the procedures to be conducted during the visit. There will be approximately twelve visits per ship during an operating cycle. Each ship visit will last from three to four days depending on the number of assessment procedures to be conducted. The initial visit after BOH is usually longer because the assessment procedures are being implemented for the first time aboard that ship. It involves collection of configuration data and is a new experience for the ship's force.

4.3 DDEOC PROGRAM MATERIAL CONDITION ASSESSMENT (MCA) PROCEDURES

An essential part of the Destroyer Engineered Operating Cycle Class Maintenance Plan (CMP) is a Material Condition Assessment (MCA) Program, which will monitor the material conditions at the ship/system level and the equipment/subsystem level. MCA procedures will be an aid to maintenance planning and management by developing data useful in forecasting requirements for major maintenance or signaling the need for increased maintenance support in specific areas.

DDEOC MCA procedures specify the tests and procedures to be performed by specialized shore-based DDEOC site teams in order to accomplish the following:

- Evaluate the effectiveness of routine prescribed maintenance to ensure that it is the minimum necessary to maintain the specific equipment
- Predict required maintenance actions necessary to maintain a high state of equipment and system readiness
- Allow for timely scheduling of maintenance actions at the appropriate level, including the scheduling of appropriate repair materials at the designated activity

The materials used to determine the condition of a ship's system and equipment in DDEOC assessment procedures vary according to the type and depth of analysis to be conducted. There can be assessment procedures developed for a particular system or equipment. The DDEOC Program Office (NAVSEA 931X) coordinates the development and preparation of assessment

procedures. Introduction of gun weapon systems for the development of MCA procedures must be coordinated with the GWSRP at this level.

4.3.1 Description

Due to the different equipments being assessed and the data needed from each equipment for material condition measurement, the MCA procedures will vary. Nondestructive methods are used to assess the condition of the system or the equipment, or both. DDEOC assessment procedures may be divided into performance or material condition evaluations, depending on the methods used. Performance assessment refers to measuring the production output of a system or equipment (e.g., discharge flow, discharge pressure). Closely associated with performance assessment, material condition assessment refers to the actual material aspects of the item (e.g., bearing wear, tube wall thickness). Although performance and material condition are two general types of assessment methods, the terms "material condition assessment" or "assessment" will be used to include both approaches.

Assessment procedures are means of determining and projecting the material condition of an item on the basis of periodic observations of performance, operating, or maintenance parameters. These procedures identify measurable operating parameters (e.g., pressure, temperature, flow rate), tests (e.g., lube oil analysis, vibration monitoring), or system performance criteria, which are real-time indications of the material condition of a system or equipment. Once the parameter, test, or performance criteria have been identified, upper and lower limiting values will be determined, establishing the boundaries of satisfactory performance. The boundaries will, therefore, encompass the expected post-overhaul condition and those values for which satisfactory performance is expected. Data will be recorded to document conditions with respect to limiting parameters.

4.3.2 Format

The development of all MCA procedures has been assigned a format corresponding to the Maintenance Requirement Cards (MRC) utilized for shipboard PMS. These instructions tell the site team members how to conduct the assessment and what data they must record. The MCA procedures also contain data sheets, as required, to facilitate recording prescribed data. Appendix D presents the level of detail that should be considered when deciding which MCA procedures for gun weapon systems would be beneficial.

4.3.3 Development Considerations

Various methods can be used for developing assessment procedures. Assessment procedures may result from analysis directed solely for the purpose of preparing the assessment procedures required for a specific equipment. More often the procedures are developed by the use of existing information from various references. System Maintenance Analyses (SMAs), other engineering analyses or evaluations, procedures developed for similar systems or equipments in other condition assessment programs, or adaptations from existing tests or inspections being conducted in the fleet are examples of applicable references.

The development of assessment procedures has been structured by the DDEOC Program Office to make the process a dynamic one. Once an assessable equipment has been identified, a preliminary assessment procedure is prepared by a Government activity or contractor tasked by the DDEOC Program Office. The preliminary procedure will be coordinated by the DDEOC Program Office with the appropriate technical codes for accuracy and adequacy. Upon completion of technical review, the preliminary procedure will be given a comprehensive shipcheck by the DDEOC site teams. Following an appropriate evaluation period, successful candidates will be prepared in final form for implementation within the system from the DDEOC Program Office.

The assessment procedures are subject to continual review after they are implemented. Changes to procedures may be generated by recommendations from operational activities (e.g., TYCOM, ship DDEOC site team) or from shore activities [e.g., NAVSEA, PERA (CRUDES), DDEOC Program Office]. All change recommendations will be forwarded via appropriate chains of command to the DDEOC Program Office for review and coordination. The continuing review and analysis of assessment procedures is designed to ensure they are providing the optimum data to demonstrate that the equipments are maintained in a satisfactory material condition compatible with a ship's engineered operating cycle.

4.3.4 MCA Review Board

All development of assessment procedures will be subject to the approval of the Material Condition Assessment Review Board, chaired by NAVSEA 931X. The board will be made up of representatives of the DDEOC Program Office, the DDEOC site teams, and cognizant technical personnel from appropriate systems commands and field activities. All candidate systems and equipments for MCA must be approved by the board before procedures are developed. When MCA procedures have been developed and field-tested, final implementation will be subject to approval by the board.

4.4 INTEGRATION ANALYSIS

The proposed integration of gun weapon systems into the DDEOC Program's development and implementation of assessment procedures should be approached in a two-step analysis process. This process should address the procedures applicable to the selection of (1) MCA candidate equipments and (2) the most effective approach to the development of MCA procedures for the candidate equipments.

4.4.1 Selection of MCA Candidate Equipments for the Gun Weapon System

The selection of specific equipments is the initial consideration when recommending candidates to receive MCA procedure development. Historically, the DDEOC Program has dealt with HM&E equipments that are found primarily within the shipboard responsibility of the Engineering Department. The single exception to this is the AN/SQS-35 IVDS system. The gun weapon systems have been excluded from DDEOC MCA procedure development consideration because the DDEOC Program Office wanted to concentrate limited resources

on the HM&E areas. Therefore, it is essential that the gun weapon system equipments selected for MCA procedure development consideration provide necessary justification. The imperative in the justification is to show the potential benefits that could be gained by increasing the amount of data collected relative to known maintenance-critical areas. The analysis of periodically collected data would suggest appropriate preventive maintenance procedures for those systems that experience significant corrective maintenance burdens or for those equipments known to be critical to systems operations and shipboard missions. Therefore, designated candidate equipments should be selected on the basis of their history of significant corrective maintenance burdens or the criticality of the equipment to shipboard operations.

An ability to develop MCA procedures that define measurable values (e.g., wear, fatigue, physical damage, time readings) that have potential for predicting failure rates should be the next major consideration. The measurements should be retrievable for analysis or trending by ship and by equipment. Procedures for the retrieval of these data should prescribe simple and quick operations that could be performed by the ship's force. Data sheets for recording assessed conditions should be an integral part of each assessment procedure. The format of the data sheets should be coordinated with the technical activity responsible for analysis of the data. This would permit recording data in an acceptable keypunch entry format.

4.4.2 Determination of MCA Development Process

The selection of candidate gun weapon systems for MCA procedure development should establish the justification for proceeding with analysis and recommending the most effective means of determining how the procedures should be developed. As has been stated previously, the DDEOC Program Office will task an activity to develop the assessment procedures. That office encourages the submittal of any information to assist it in making that decision. Therefore, it would be to the GWSRP's advantage to recommend (1) the activity best qualified and (2) the process for developing the MCA procedures. The following processes should be considered:

- Results of SMAs
- Engineering Analyses
- Assessment Procedures Developed for Similar Systems/Equipments
- Application of Existing Tests or Inspections Being Conducted

The DDEOC Program identification of candidates for MCA development has started from the results of SMAs. The SMAs for 5"/54 Caliber Gun Mount Mk 42 Mods 9 and 10 and Mk 68 Gun Fire Control System have been reviewed for recommendations concerning MCA development. These documents made no specific mention of assessment procedures.

The alternative processes can be categorized as requiring either new engineering analysis or application of existing procedures. Both categories have their advantages and disadvantages. The major advantage of conducting

a new engineering analysis is its sole objective of producing an assessment procedure. The major drawback associated with this process is its cost. The development of the assessment procedures should concentrate on the direct or modified use of existing assessment information and procedures. This process should result in the quickest development time and least costs. It would save engineering development, personnel training, and time for implementation by the ship's force. Neither of the two approaches should be used without a cost comparison analysis between the two.

After the process for the development of the assessment procedures has been determined, the assessment parameters and values are established. For the parameters identified, the value levels that correspond to the best operation or material condition to be expected and the value levels that correspond to the minimum acceptable performance or condition must be specified. These values should be measured against a single parameter. Interaction of various parameters should be considered in the analytical process that follows the data collection.

4.4.3 Potential MCA Candidates

This analysis reviewed the equipments and components found in the two major gun weapon systems aboard the FF-1052 Class -- the 5"/54 Caliber Gun Mount Mk 42 Mod 9 and the Mk 68 Gun Fire Control System. These systems were selected because they are on all but one of the FF-1052 Class ships, which is currently the only DDEOC Program class of ships on which MCA procedures have been implemented. The analysis of these systems was oriented toward establishing potential MCA candidates from the application of existing tests, inspections, and other assessment procedures.

A candidate MCA procedure for the 5"/54 Caliber Gun Mount Mk 42 Mod 9 would use various time meter readings. There are six time meters on the reverse side of the EP2 panel rear door. They record various elapsed operating times for equipments and components of the gun mount. This information is being used by the Weapons Quality Evaluation Center (WQEC) Naval Weapons Station, Concord, in a modified format. The Center currently is not being provided with enough readings from Fleet units. This time meter data would greatly enhance the validity of many of WQEC's reports since the present practice is to use estimates of energized time. These time meter readings, if recorded periodically and assigned assessment parameters, could provide information helpful in determining existing material condition and operational performance levels. Developing an assessment procedure for these meter readings should require a minimum of engineering effort. Standardizing the procedure in MRC format would be required but this also should be simple to do.

There are numerous other measures of various parameters throughout these systems. For the 5"/54 Caliber Gun Mount Mk 42 Mods 9 and 10, there are numerous measurements specified by the 3-M System. These PMS checks have been historically used by the ship's force to indicate equipment status for operational readiness purposes. Given a reading outside the

allowable parameters, a corrective action is taken (e.g., add more fluid for a low fluid level reading). An advantage of these procedures is that they are in the PMS MRC format. Some of the checks being performed on the 5"/54 Caliber Gun Mount Mk 42 that have potential applicability to assessment procedure development follow:

- Temperature readings
- Accumulator pressure
- Record fluid level
- Counter recoil air pressure
- Upper accumulator nitrogen pressure
- Lower hoist accumulator nitrogen pressure
- Loader accumulator nitrogen pressure
- Main supply tank fluid level
- Lower hoist accumulator supply tank fluid level
- Loader accumulator fluid level
- Cradle-to-slide buffer measurement
- Empty case tray buffer measurement

These checks are currently being made by ship's force and various assistance activities. The most important advantages of incorporating checks and assessments of this type into a program like that of the DDEOC MCA effort would be the resulting standardization of inspections, increased frequency and thus amount of data, and the continual provision of data for analysis. Making the data available to a competent analysis activity would permit the trends that are visible on one ship to be compared with the rest of the ships in the class and would allow continual assessment instead of an as-required (corrective action only) assessment.

These PMS requirements could be easily utilized as guides for MCA procedures to be performed by either a DDEOC site team or by ship's force (with measurements and readings forwarded to the DDEOC site teams). These measurements, if assessed periodically, would provide information required to determine material condition and more specific operational performance parameters. That information in turn would be used to identify the approach of unacceptable material condition performance levels, thereby forecasting the need for major corrective or restorative maintenance.

MCA candidates can be selected by the identification of equipments and components that contribute significantly to the maintenance burden (man-hours and parts dollars expended) of a particular system. Integrating these equipments into an MCA program can save maintenance man-hours and parts dollars by properly identifying trends indicating degrading performance and taking appropriate action before costly major repairs are needed. Significant contributors to the maintenance burden of gun weapon systems,

specifically the Mk 68 GFCS and 5"/54 Mk 42 Mod 9 Gun Mounts, have been identified by ARINC Research Corporation by means of extensive systems maintenance analyses (SMAs). We analyzed historical Maintenance Data System (MDS) data at the Allowance Parts List (APL) level to determine which equipments and components were responsible for a significant amount of maintenance man-hour and parts dollar expenditures. The total maintenance burden for the gun fire control system was recorded for each of four different data categories: parts dollars, total job control number (JCN) transactions, ship's force man-hours, and IMA man-hours. The equipments and components within the Mk 68 gun fire control system were then analyzed and top contributors to the total maintenance burden were identified.

The review of experience for the Mk 68 GFCS revealed that the equipments listed in Table 4-1 contributed approximately 90 percent of the total system maintenance burden, as shown in Table 4-2.

Table 4-1. MK 68 GUN FIRE CONTROL SYSTEM COMPONENTS	
Nomenclature	APL
AN/SPG-53A Radar	56995306
AN/SPG-53A Radar	56995307
Mk 47 Mod 10 Computer	49402526
Mk 47 Mod 11 Computer	49402700
Mk 68 Mod 3 Director	49401956 49402586
Mk 2 Mod 0 Director Drive	49402515
Mk 1 Mod 1 RSPE	78640113
Mk 16 Mod 2 Stable Element	49402030
Mk 68 GFCS	91200155
Mk 75 Rangefinder	49401988 49402731

There are 51 APLs in the system. These 12 APLs, which accounted for approximately 90 percent of the system maintenance burden, represent only 23.5 percent of the total number of APLs.

A similar analysis of the 5"/54 Mk 42 Mod 9 Gun Mount reveals the top 10 APLs, listed in Table 4-3, as significant maintenance burden contributors. The breakdown of costs is shown in Table 4-4.

Table 4-2. MK 68 GUN FIRE CONTROL SYSTEM BURDEN
BREAKDOWN

Data Category	Total Reported for System	Percent of Burden Represented by Selected APL
Parts Dollars	\$2,769,224	9.0
JCNs	13,528	87.0
Ship's Force Man-Hours	61,711	89.2
IMA Man-Hours	4,599	83.6

Table 4-3. 5"/54 MK 42 MOD 9
GUN MOUNT
COMPONENTS

Nomenclature	APL/CID
Carriage Assembly	006030002
Control Panels	006030015
Ammo Hoist, Upper	006030003
Slide Assembly	006030007
Shield Assembly	006030013
Housing	006030012
Empty Case Ejector	006030010
Rammer Assembly	006030009
Ammo Hoist, Lower	006030014
Gun Barrel, Mk 18	006030019

Table 4-4. 5"/54 MK 42 MOD 9 GUN MOUNT SYSTEM BURDEN
BREAKDOWN

Data Category	Total Reported for System	Percent of Burden Represented by Selected APL
Parts Dollars	\$1,565,212	88.6
JCNs	8,272	68.4
Ship's Force Man-Hours	37,705	78.3
IMA Man-Hours	6,503	55.5

The order of components in Tables 4-1 and 4-3 was determined by (1) ranking each component by total man-hours and by parts costs separately, (2) adding the two rankings, and (3) ordering the components from the lowest to the highest by the combined number. For components with equal combined rankings, the total man-hours ranking was given more weight.

There are 17 major APLs in the system; the 10 APLs that accounted for approximately 75 percent of the system maintenance burden represent 58.8 percent of the major APLs.

In the selection of MCA candidates for inclusion in an assessment program, the above-mentioned APLs should be given priority. The effort of identifying MCA procedures for the gun weapons systems can therefore concentrate on those 17 equipments and components. MCA procedures for these equipments and components can be developed from SMAs or other engineering analyses or evaluations, or can be adapted from existing tests or inspections being conducted in the Fleet. Present Planned Maintenance System (PMS) maintenance checks can be readily utilized to aid in the monitoring of these systems. Changes to periodicities and requirements for documenting and forwarding inspection and test results would be the only substantial changes that would have to be made to this already existing monitoring program. It is recommended that the subject APLs be investigated to determine what tests and inspections (such as existing PMS checks) are amenable and would be beneficial to an MCA program.

Assessment procedures should normally be executed during the DDEOC site team visits to each ship. Another means of assessment would be to use already existing tests and inspections (MCR/POT&I, CSRTs/CSRRs, self-assessment) for the recommended MCA procedures. Added benefits to this alternative would be that the MCA procedures would be accomplished by highly qualified personnel (NAVSEACENS), and less manpower and operational time requirements would be demanded of the respective ships. These alternatives will be discussed fully in the remaining subsections of this chapter.

4.4.4 GWS Assessment Data Currently Available

There are currently many inspections being performed under the cognizance of TYCOM, GWSRP, and DDEOC Programs that could provide the gun weapon community with a viable material condition assessment program. Figure 4-3 displays each organization's maintenance requirements individually and all of them collectively. Nearly all of these inspections utilize existing PMS requirements as a basis for determining maintenance needs. A description of each of these inspections follows.

For pre-overhaul planning, the POT&I employs various PMS checks to help determine maintenance needs. These PMS checks are incorporated into the repair inspection requirements (RIR) and are performed in conjunction with other visual inspections and operational checks. Discrepancies are incorporated into the ship's BOH/ROH SARP. Post-overhaul inspections are conducted under the purview of the class Post-Repair Test and Certification

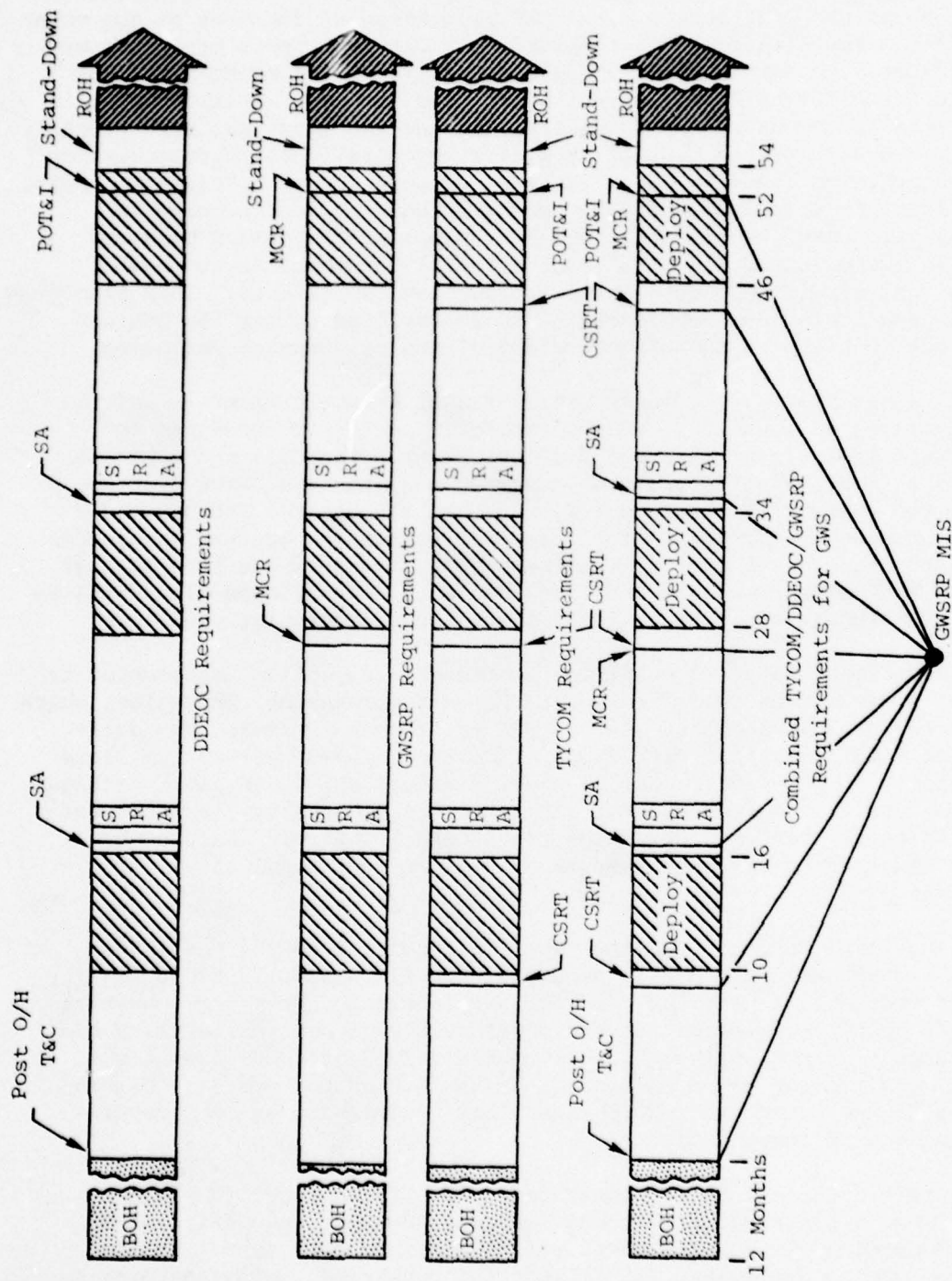


Figure 4-3. INDIVIDUAL AND COLLECTIVE ORGANIZATIONAL MAINTENANCE REQUIREMENTS

Program. These inspections are performed at two different levels depending upon the degree of maintenance performed on the gun mount during overhaul. If a gun mount has undergone a Class "A" refurbishment (removal of gun mount to NOSL and reinstallation upon completion of repairs) tests are performed in accordance with NAVORD 8948 (5"/54 caliber single gun mount Mk 42 Mod 9 shipboard installation test instructions). The intent of that document is to prescribe an adequate test to ensure that the gun mount has been properly installed and adjusted, and that the specified operational characteristics have been achieved. Due to the "like-new" restoration of a "Class A repair, the requirements specified are very extensive and the test program is generally more complete than the technical procedures required by a PMS check. In the event of Class "B" overhaul of a gun mount or gun weapon system a post-repair test and certification plan is followed. This plan consists of existing PMS requirements and is employed during the BOH and ROH periods to evaluate the effectiveness of the maintenance performed.

The Combat Systems Readiness Review (CSRR) Atlantic Fleet -- and the Combat Systems Readiness Test (CSRT) Pacific Fleet -- are designed to assist ships in their preparation for deployment. The CSRR and CSRT are important to the overall support of gun weapon systems on DDEOC Program ships in two ways: (1) they identify required maintenance actions and (2) they provide justification for immediate repairs to gun weapon systems. Repairs are an integral part of the inspection, except those repairs that cannot be accomplished within the time available. Both inspections utilize existing PMS requirements to evaluate operating and material condition.

An additional material condition assessment inspection implemented by the Fleet to assist in SRA planning is the self-assessment inspection, which is conducted by ship's force. Before SRA maintenance periods, the self-assessment findings, along with inputs from the ship's CSMP and the Class Maintenance Plan (CMP) will make up the individual ship's SRA work package. The purpose of the self-assessment inspection is to identify any emergent type maintenance problems just prior to the SRA. The self-assessment consists of existing PMS requirements as well as additional visual inspections.

The Material Condition Review (MCR) is conducted by the Naval Sea Centers (NAVSEACENS). An MCR is required when (1) a ship is scheduled for a regular overhaul or baseline overhaul, (2) the ship has equipments that have never been reviewed, or (3) the previous MCR is over three years old. The MCR uses a comprehensive checkoff booklet aimed at ascertaining the material condition of major components of the gun weapon system. Discrepancies that are noted are incorporated into recommendations for repairs or replacement of components.

Figure 4-3 depicts the approximate periods in the DDEOC deployment schedule when a given material condition assessment or inspection could occur. Combining the MCR and POT&I before ROH, and the CSRR/T and MCR before the second deployment (to satisfy the requirement of performing an MCR every three years) would help in providing the TYCOMs with the most efficient and cost-effective inspection process for gun weapon systems.

The inspections depicted in Figure 4-3 are used to identify material/performance discrepancies that generate corrective maintenance actions to be performed either on a short-term (CSRR/Ts, self assessments) or long-term (MCR/POT&I) basis. The results of all these inspections are now submitted to only one common management organization -- the TYCOMs. No long-term engineering analysis is performed on the results. Material condition trending could aid in predicting degraded performance or material condition and aid in scheduling timely maintenance actions.

All these inspections can be utilized to provide maintenance requirement information to the GWSRP and DDEOC Programs. As mentioned before, billets for gun weapons personnel do not exist on the DDEOC site teams and there are no procedures for assessing the material condition of gun weapon systems in effect for the DDEOC site teams to perform. The objective of the MCA program is focused on HM&E-type equipments. There are now approximately seven instances in a typical ship's engineered operating cycle when data can be collected and applied to MCA-related analyses. These inspections provide a viable alternative to adding gun-weapons-system-oriented personnel and inspections to the DDEOC site teams. We recommend the provision of a vehicle for the central data collection of these inspections to enable data to be exchanged between the GWSRP and DDEOC Program. Those inspection requirements that are amenable to application to an MCA program should be monitored. Decisions on which inspection requirements can be used in an MCA program should be based on results from System Maintenance Analyses (SMAs) or similar technical evaluations.

Once an assessment action has been identified, a preliminary assessment procedure would be prepared in standard 3-M Maintenance Requirement Card (MRC) format by the cognizant Government activity or contractor. Since the majority of existing inspections already use an MRC format, any maintenance requirements that are determined to be useful in an MCA Program, i.e., those that identify real-time indications of a system's material condition, would probably require little change in format for incorporation into an MCA Program.

Naval Ordnance Station, Indian Head (NOSIH) could be the central data collection point for all inspection results. Data would be evaluated to determine potential problems. A report of the data evaluation findings would be forwarded to the ship to alert the personnel of the potential problems that they can correct or should put into the CSMP for inclusion in a future IMAV or SRA work package. It is envisioned that many discrepancies would be corrected on the spot by ship's force as a normal procedure in conducting a PMS. NOSIH data evaluation would center on long-range trending analysis of material condition. WQEC NWPSTA, Concord, could assist in this analysis by programming MCA data for dissemination via the GWSRP Management Information System. Besides identifying maintenance requirements, the analysis could result in recommendations to decrease or increase the frequency of PMS actions as material condition is trended over a period of time. To aid in the efficient operation of this MCA program, ship's force should schedule designated PMS activities to coincide with scheduled inspections (CSRR/T, post-overhaul T&C, self-assessment, MCR/POT&I) and

inspections should be combined when practical (CSRR/T and MCR before second deployment and MCR and POT&I before ROH). These actions would decrease demands on ship's force and ship operating time.

4.4.5 Integration of GWSRP Expertise

Given that both principal participants agree that MCA procedures for gun weapon systems are both necessary and feasible, the identification of means to implement them must be made. A substantial portion of this task was concerned with obtaining inputs and feedback on the optimum procedure for providing GWSRP expertise to DDEOC site teams. The following recommendations describing the various methods that provide the basis upon which an integration procedure can be established are presented for consideration.

GWSRP expertise can be integrated into DDEOC in the following ways. (Not all the activities involved report directly to or are tasked by NAVSEA-62GYB.) The major options are:

- (1) NAVSEACENS can be tasked to assist site teams.
- (2) GWSRP can identify expertise to develop and/or review MCA procedures.
- (3) TYCOMs can assign inspectors from existing resources, using MCA procedures developed and/or approved by GWSRP.

The first approach would provide the best immediate technical input but would be the most difficult to implement. In accordance with NAVSEA-INST 4350.6 of 28 November 1978, "NAVSEASYS COM Direct Fleet Support (DFS) Program; policies and procedures for", the NAVSEACENS function as their respective Fleet's NAVSEA waterfront coordinator for all requests for NAVSEA DFS technical assist visits. In this capacity they conduct periodic as well as emergency type reviews, tests, trials, and inspections to evaluate, ensure, or appraise the effectiveness and material condition of ships' equipments and systems in a operational control of Fleet commanders in chief in accordance with authorized and approved NAVSEA SEATASKS. The inclusion of site team support would appear to be a defined service provided by the DFS program and should be so documented in the NAVSEACENS respective SEATASKS.

In conversations, NAVSEA-0463 indicated that the NAVSEACENS are not presently tasked to perform the type of assessments called out by site team inspections. NAVSEA 62YGB and 931X should jointly petition NAVSEA-0463 to have included those assessments in the NAVSEACENS SEATASKS.

The amount of time perceived to be needed to conduct gun weapon systems MCA inspections will be on the order of one working day. This should not place any undue burden on the NAVSEACENS as the site team inspections are presently scheduled only four times a year per ship. Additional engineering analysis might indicate that it is not necessary to send the NAVSEACENS on board every ship four times a year. This would reduce manning requirements for designated GWS MCA procedures. NAVSEACENPAC personnel reported that they believed this approach would place a burden

on their existing manning levels. An underlying sentiment was that the NAVSEACENS do not want to get involved with inspections that "put the ship on report." This is a misconceived understanding of the purpose of the DDEOC site team visits. Overcoming this misconception might reduce some of the NAVSEACEN's resistance to involvement with this concept.

The greatest impediment to implementing this method would be the assignment of personnel to the site team on a TAD basis. All parties interviewed felt that this would present considerable problems in spite of the technical benefits gained. This issue would have to be resolved at the onset of discussions concerning this integration method. The utilization of the NAVSEACEN would provide the best technical experience but would be met with so much resistance that this approach was considered to present more problems than solutions.

The second recommended method proposes the integration of GWSRP expertise into the site team effort by having the GWSRP take the lead in developing the MCA procedures to be used on the gun weapon systems. The GWSRP manager would jointly support NAVSEA 931X in the tasking of cognizant technical activities to develop the MCA procedure or review a developed MCA procedure for technical accuracy. Although this method does not mention the technical personnel who would implement the MCA procedure, the issue would have to be resolved so that the MCA procedure would be written to the appropriate level of technical proficiency for the implementing personnel. This input could be the primary interface the GWSRP would seek to establish with NAVSEA 931X. If the procedures are technically correct to the satisfaction of the GWSRP, use of non-GWSRP associate personnel to collect the data in accordance with written procedures should be acceptable.

By assigning TYCOM resources with the requisite skill ratings to assist the site teams, as method three calls for, the TYCOM retains complete control over all assigned personnel. Representatives of COMNAVSURFPAC/LANT staff and the San Diego and Norfolk DDEOC site teams envisioned that the integration of personnel not assigned to TYCOM would present problems. They did not believe the problems would be easily overcome, but if the issue could be avoided, the possibility of getting gun weapon systems integrated into the overall site team efforts would be enhanced. Methods two and three are recommended to overcome any difficulties the TYCOMs might have with the DDEOC site teams losing their autonomy, although the personnel represented in these organizations are not GWSRP resources. In spite of that fact, it is believed that a trade-off between GWSRP development and/or review of the MCA procedures and TYCOM assignment of personnel to conduct them could be accomplished. The problem still remains to find an available source of manpower that can be readily and agreeably utilized to conduct gun weapon system MCAs.

Subsection 4.4.4 addressed the numerous inspections presently being conducted from which the combining of results into a single data base could provide a significant pool of information to assist in the assessment of the material condition of gun weapon systems. Recent developments in the GWSRP and DDEOC Program integration efforts resulted in the NAVSEACENS being tasked to conduct the gun weapon system portions of PERA(CRUDES) POT&I. This is discussed in detail in Chapter Six. The result of this

additional inspection requirement has resulted in a more vocal opposition by the NAVSEACENS to any direct involvement with the inspections conducted by the DDEOC assessment program. This opposition coupled with the TYCOMs sentiments against using outside personnel as site team members reduces the advantages of using the NAVSEACENS. It leaves two alternative recommendations by which the GWSRP can integrate its interests into the DDEOC site team effort. First, the GWSRP can petition for another billet to be added to the TYCOM site teams from which they will provide the funding. This option would be extremely difficult to bring about and would require justification in a future POM or reprogramming of an existing military billet. That could be very costly. The second option would be for the GWSRP to petition the DDEOC Program Office to allow the GWSRP to send its own inspectors (not necessarily NAVSEACEN personnel) aboard the DDEOC Class ships with the site teams for the purpose of gathering assessment data. Procedures would conform with those employed by the site teams. The GWSRP inspectors would report directly to the commanding officer of each ship and work closely with the weapons officer. Scheduling coordination would be mutually resolved between the GWSRP, DDEOC site teams, and TYCOMS. The GWSRP-designated inspectors would not necessarily go aboard each ship every time a DDEOC site team visit was scheduled. This approach would resolve any problems of TAD personnel assigned to the site teams. The data gathered would be shared with the DDEOC Program Office if requested. Sending two distinct organizations aboard using identical procedures with the same objective would impose minimum confusion on the ship's force and maximum return from the scheduled period for the site team visit.

4.5 INTERFACE PROCEDURES

The procedures recommended for the integration of the gun weapon systems into the DDEOC Program resulted from analysis of the programs' existing management policies. The procedures address two phases of integration -- development and implementation. There must be a distinction between the two because the varying functions involved in the development of the MCA procedures and the actual conduct of the assessment inspection are distinct. It is feasible that the GWSRP's interaction may only involve one of the two phases for any proposed gun weapon system assessment procedure. The procedures as presented here will assume the GWSRP's involvement in both phases.

4.5.1 Development Phase Procedures

During the development phase, the following steps should be taken:

- NAVSEA 931X should plan and establish the policy and procedures for MCA procedure development. The significant portion of these will appear in the DDEOC Program Management Plan.
- NAVSEA 62YGB should establish the candidate gun weapon system equipments for MCA procedure development. Included with each candidate equipment should be a recommended process (e.g., new analysis study, current procedures, PMS) and the activity recommended to develop the procedure.

- NAVSEA 62YGB should forward MCA candidates to the MCA Review Board for approval.
- The MCA Review Board should review the proposed candidates and designate approved ones.
- NAVSEA 931X should designate the appropriate technical activity to take development action on approved gun weapon system candidates.
- NAVSEA 931X should inform NAVSEA 62YGB of action taken for approved candidates. The authority to have the MCA procedure developed can be delegated to NAVSEA 62YGB. NAVSEA 931X should inform NAVSEA 62YGB of the reasons for disapproval of candidates not accepted.
- NAVSEA 931X or NAVSEA 62YGB should follow the assessment procedure development. The preliminary procedure will be submitted to NAVSEA 62YGB for review.
- NAVSEA 62YGB should forward the reviewed procedure in MRC format to NAVSEA 931X for final review and verification ship check by DDEOC site teams.

4.5.2 Implementation Phase Procedures

During the implementation phase, the following steps should be taken:

- DDEOC site team should schedule ship visits one month before the start of each quarter.
- Gun weapon system assessment procedures to be conducted for each site team ship visit should be forwarded by the program office at least two weeks before the visit.
- When the site team leader receives a schedule and assessment procedure listing, he should request TYCOM-assigned personnel to conduct the gun weapon system portion of the inspection.
- TYCOM should provide personnel for the duration of the gun weapon system inspection only. They will provide comments in writing and orally to the on-board team leader. If necessary, a debrief can be held with the commanding officer, weapons officer, and other shipboard personnel before the inspectors depart.
- Site team reports should be forwarded to the DDEOC Program Office. The Program Office should provide NAVSEA 62YGB with copies of the gun weapon system portions of the inspection.
- NAVSEA 62YGB should distribute the data to the designated analysis activity. Any significant trends or previously unobserved conditions that result from analysis and could effect the ship or DDEOC Program will be forwarded to the ship or NAVSEA 931X with appropriate recommendations.

4.6 CONCLUSIONS AND RECOMMENDATIONS REGARDING GWSRP SUPPORT TO SITE TEAMS

From the conclusions drawn from the analysis of integrating GWSRP expertise with the DDEOC Program Site Teams, we have developed recommended methods for introducing gun weapon systems into the DDEOC Program site team effort and procedures for integrating GWSRP support into site teams. Cooperative action by the two programs will be required to initiate the development of material condition assessment procedures for gun weapon systems and implement the shipboard inspection of these systems.

4.6.1 Conclusions

The following conclusions resulted from the study:

- MCA procedures can be developed for gun weapon systems: Equipment displaying a high maintenance burden and high failure rates can be assessed to provide better maintenance requirements for "on-condition" instead of "on-time" service.
- Use of existing DDEOC Program policy and procedures prescribing MCA procedure development will provide the optimum continuity and minimum confusion for integrating gun weapon systems into the DDEOC Program assessment effort.
- The GWSRP can initiate the integration of gun weapon systems into the DDEOC Program site team effort by proposing development of assessment procedures for time meter readings. These readings give actual hours of operation, and their assessment could set a precedent for future program interface.
- The development of assessment procedures for gun weapon systems will require the identification of those equipments that could best benefit from periodic assessment. This process can be implemented most easily by utilizing existing MDS data coupled with such other data as CASREP, CONARS, and inspection results.
- Many procedures are used to check gun weapon systems and equipments for material and operational conditions. The use of existing procedures and documents will result in the quickest, most cost-effective means of developing MCA procedures for site team utilization.
- The augmentation of the DDEOC site teams with experienced gun weapon system personnel poses the most difficult problem in this integration effort. Use of TYCOM-designated personnel would solve the problem if such personnel can be identified.
- An alternate source of material condition assessment data for the GWSRP can be the existing routinely conducted inspections and checks. These data need to be compiled and analyzed. This can be accomplished independently of the DDEOC Program site team effort and could be integrated with existing MCA procedures through the proposed management information systems data exchange.
- The integration of GWSRP experts into the material condition assessment of gun weapon systems in the DDEOC Program can result in improved maintenance procedures for gun weapon systems.

4.6.2 Recommendations

On the basis of the study conclusions, the following recommendations are offered:

- MCA procedures should be developed jointly by the GWSRP and the DDEOC Program for gun weapon systems with equipments displaying high maintenance burdens and high failure rates.
- Gun weapon system assessment procedures should be jointly developed in accordance with the established DDEOC Program Office policy and procedures.
- The GWSRP should initiate the integration of the gun weapon systems into the DDEOC assessment program by proposing the equipments to be assessed, the optimum process for developing assessment procedures, and the recommended activity to produce the assessment procedure in MRC format.
- The identification of gun weapon system equipments to be considered for assessment procedure development should result from analysis of MDS data and other relevant data that indicate the presence of significant maintenance problems.
- Development of gun weapon system procedures for selected equipments should utilize existing inspections, procedures, and documents to the maximum extent possible. The procedures should be written to make clear that data compilation is its first and foremost objective.
- The DDEOC Program site teams should be augmented with experienced gun weapon systems personnel assigned by the TYCOM. The procedures should be developed by personnel designated by the GWSRP and DDEOC Program Office. These procedures should be implemented by adding TYCOM-designated personnel to the site team for the inspection period.
- The GWSRP manager should appoint a single activity (such as NOS Indian Head) to serve as the data collection and assessment center for gun weapon systems. This activity should direct the GWSRP's assessment procedures in parallel with those of the DDEOC Program, exchanging data through each program's MIS where required.
- Specific procedures for developing and implementing material condition assessment procedures for the gun weapon system, as recommended in this study, should be agreed upon and implemented between the GWSRP and DDEOC Program managers.

CHAPTER FIVE

UPDATE OF NAVSEAINST. 8300.2A, GUN WEAPON SYSTEM REPLACEMENT PROGRAM

5.1 INTRODUCTION

NAVSEAINST. 8300.2A, *Gun Weapon System Replacement Program*, prescribes the policy and procedures for the current operation of the GWSRP. Recent increases in the overall demands for reliable performance of these gun weapon systems coupled with new budget constraints and a need for efficiencies between existing programs required that the basic program instruction be updated. One of the primary considerations assigned was the incorporation of procedures for providing an interface between existing program policy and procedures and the DDEOC Program and other newly established EOC programs. This study provides the specific integration agreements and assigns responsibilities to GWSRP participants.

5.2 NAVSEAINST 8300.2A UPDATE APPROACH

The approach to this task was the same as those to tasks one through four. A primary difference in the application of that approach was the amount of data utilized for this task. The basic instruction served as the reference for the update. We used very few other written documents, reports, or publications. The majority of the input resulting in the NAVSEAINST 8300.2B edition came from comments by the various GWSRP participants. Comments were obtained individually from personnel representing the TYCOMs, NAVSEACENLANT, NAVSEACENPAC, NOS Indian Head, NAVSEA-931X, NAVSEA-62YGB, and PERA (CRUDES) at various times through the effort. The meetings that resulted in significant inputs were:

- GWSRP Planning Meeting of 15 November 1978
- NAVSEA-0432 (now 62YGB) and NAVSEA-934X (now 931X) meeting of 3 April 1979
- GWSRP Planning Meeting of 10 April 1979
- MCR/POT&I Integration Meeting of 12 June 1979

The recommendations that were generated through research and from the comments by the various commands were validated to the extent possible by requesting feedback from all participants regarding their benefits and

feasibility. In some cases no clear consensus could be obtained from the community so the recommended changes were made on the basis of efficiencies the program would gain through their implementation.

5.3 UPDATE RESULTS

The effort resulted in two final drafts of the recommended NAVSEAINST 8300.2B. The first draft was submitted 15 May 1979, as was required by the contract. It contained the majority of the recommended changes. A summary of the major areas of recommended change follows:

- Code changes resulting from NAVSEASYSKOM realignment
- Changes in terminology to reflect current GWSRP practices
- Additions to the overall program purpose reflecting integration efforts with EOC programs
- Additions to specific removal-installation actions required by the NAVSEACENS and NOSL to minimize losses of non-overhauled parts during the overhaul process
- Addition of documentation for scheduling of refurbishment
- Addition of instructions to the installing activities
- Addition of required actions by NAVSEA-07 for GWSRP overhauls in the private and public sectors
- Minor editorial changes

The GWSRP is a dynamic program supported by the basic instruction (NAVSEAINST 8300.2 series), which is updated periodically to record the most current policies and procedures. Actions taken by the program manager after our initial delivery required us to make changes to the recommended draft. The results of the MCR/POT&I integration meeting of 12 June 1979 were significant enough to warrant inclusion in the basic instruction. The recommended changes were included in the final draft, enclosed as Appendix E.

Since the GWSRP program is dynamic and has displayed a management philosophy responsive to both the policy and operational activities involved in the maintenance support of gun weapon systems, the basic instruction can be expected to require periodic changes. The recommended draft of NAVSEAINST. 8300.2B includes the changes that have occurred up to the time of delivery. It by no means constitutes a permanent edition. It is foreseen that as increased integration actions occur between the GWSRP and EOC programs this instruction will be the vehicle by which to communicate these actions to all levels of interested commands.

5.3.1 Conclusions

The following conclusions are offered as a result of the update effort.

- The integration of GWSRP and EOC program actions can be officially communicated to all interested activities by inclusion in NAVSEAINST 8300.2 series.
- The GWSRP is dynamic. It remains responsive to many external organizations and Navy policy statements. The NAVSEAINST 8300.2 series is the vehicle with which to continually document this responsiveness.

5.3.2 Recommendations

The following recommendations are offered as a result of the update conclusions.

- All agreed-upon GWSRP and EOC integration actions should be documented in the NAVSEAINST 8300.2 series.
- NAVSEAINST 8300.2 series should be updated periodically to reflect and communicate current GWSRP policy and procedures.

CHAPTER SIX

GUN WEAPON SYSTEM REPLACEMENT PROGRAM COORDINATION

6.1 INTRODUCTION

One of the principal objectives of this effort was to provide continuing engineering and management support for the GWSRP's integration with the DDEOC Program. Part of this effort was devoted to obtaining information from the various elements of the GWSRP. Comparison of this information and frequent communication with all parties concerned enabled ARINC Research to ensure that various viewpoints were included to maintain the objectivity of this report. The principal meetings ARINC Research personnel attended as both participating and non-participating attendees to obtain and provide information are listed in Table 6-1. This direct interface with all program participants also ensured that unique problems were not overlooked. As part of this ongoing coordination effort, proposed maintenance programs that involved the gun weapons systems were investigated. Currently the coordination effort has involved itself with the DDEOC Program. There are existing and emerging EOC Programs that will directly affect the maintenance of gun weapons systems and the GWSRP itself.

6.2 ENGINEERED OPERATING CYCLE PROGRAMS UPDATE

The Gun Weapon System Replacement Program Coordination Effort Study has involved itself with the DDEOC Program and the gun weapon systems managed by the GWSRP on ships in current or proposed EOC programs. Therefore it was considered important to this study to identify the status of EOC programs.

6.2.1 EOC Program Background

All of the numerous EOC programs scheduled and in various stages of development and implementation have common goals and similar support and interface requirements. These similarities and commonalities offer the advantage of established support organizations, plans, techniques, etc., for the establishment of new EOC programs. A general, phased process for development and implementation of EOC requirements for any specified ship class has been produced by the Ship Support Improvement Project (PMS-306). Prior experience in submarine and destroyer EOC programs was liberally

Table 6-1. MAJOR MEETINGS ATTENDED IN SUPPORT OF EFFORT		
15 November 1978	NOS Louisville	Semi-Annual Planning Meeting
24 January 1979	PERA(CD)	BOH Requirements
26 January 1979	PERA(CD)	MIS Interface
3 April 1979	ARINC Research Corp.	SEA-432/931X Mutual Interests
10 April 1979	NOS Louisville	Semi-Annual Planning Meeting
30 April 1979	WQEC Concord, Ca.	MIS Interface
2 May 1979	COMNAVSURFPAC	Contract Tasks 1-5
3 May 1979	NAVSEACENPAC	Contract Tasks 1-5
4 May 1979	San Diego Site Team	GWSRP/DDEOC Pro Site Team Interface
12 June 1979	ARINC Research Corp.	MCR and POT&I Integration Meeting
25 July 1979	PERA(CD)	Tasks 1, 2 and 5
2 August 1979	COMNAVSURFLANT	Tasks 1 - 5
2 August 1979	NAVSEACENLANT	Tasks 1 - 5
2 August 1979	Norfolk DDEOC Site Team	GWSRP/DDEOC Program Site Team Interface

applied in the structuring of a uniform process to be applied to all candidate ship classes. Present planning provides for engineering maintenance requirements and procedures to improve and maintain material condition by means of EOC programs for 43 percent of the fleet by the mid-1980s. The remaining 57 percent are surface ships of a variety of ship classes that are potential candidates for the development and implementation of EOC programs. The status of existing and proposed EOC programs as of August 1979 is shown in Table 6-2.

6.2.2 DDEOC Program Status

The DDEOC Program has recently added the DD-963 Class. The same basic EOC philosophy will apply to this class except it will not receive an initial BOH because all ships in the class are new. Ships in the DDG-2 Class Conversion Program were added to the DDEOC Program in September 1976, but in December 1978 the Chief of Naval Operations (CNO) decided to defer entry of this class in DDEOC.

Table 6-2. ESTABLISHED AND PROPOSED EOC PROGRAMS			
Ship Category	Ship Class	Implementation Status	
		First	Final
Established EOC Programs			
SSBN	All Poseidon-equipped SSBNs	1971	1977
SSN	All SUBSAFE SSN 594 Class	1972	1981
DDEOC	FF-1052, DDG-37, CG-16, CG-26, DD-963	1977	1986
Lo-Mix	FFG-7, PHM-1	1977	1988
Proposed EOC Programs			
PEOC	LHA-1, LPH-2, LST-1179, LPD-4	1982	*
*To be determined, depending on the number of classes to be incorporated into PEOC program.			

Major efforts that have been completed to date by the DDEOC Program are:

- BOH planning for all classes
- BOH entry by FF-1052s, DDG-37s
- CMP planning for FF-1052 and DDG-37 Classes

As part of the above efforts System Maintenance Analyses (SMAs) have been performed on selected systems and subsystems of program-designated surface combatants. The principal element of an SMA is the Review of Experience (ROE). An ROE is an analysis of existing and anticipated problems that affect the operational performance or maintenance program of a ship system. The ROE report serves as a vehicle for assessment of the significance and consequences of identified problems. It also recommends specific actions that will prevent or reduce the impact of problem occurrence while improving material condition and maintaining or increasing system availability throughout an extended ship operating cycle.

Table 6-3 lists SMAs that have been conducted that affect the GWSRP. Recommendations that are formulated in these reports should be considered by GWSRP managers when inspections and repairs are performed. It is also important that GWSRP managers maintain a continuous dialogue with NAVSEA-931X, providing input to SMAs not yet completed and feedback on those previously completed.

Table 6-3. GWSRP-RELATED SMAs		
SMA	Date Completed	Class
Mk 68 GFCS (Mods 11, 13, 14)	March 1977	FF-1052
MK 68 GFCS (Mod 6)	September 1978	DDG-37
Mk 68 GFCS (Mod 8)	July 1979	CG-26
5"/54 Cal. Mk 42 Gun Mount (Mod 9)	October 1976	FF-1052
5"/54 Cal. Mk 42 Gun Mount (Mod 10)	December 1978	DDG-37
5"/54 Cal. Mk 42 Gun Mount (Mod 10)	August 1979	CG-26

6.2.3 Lo-Mix Status

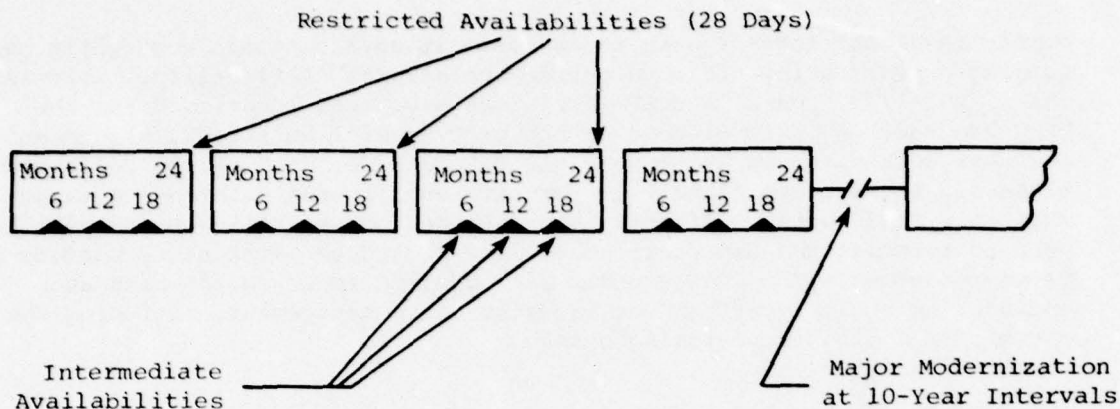
The FFG-7 Class ship is the forerunner of the Lo-Mix element of the Navy "High-Lo-Mix" concept. This concept provides a combination of expensive, highly versatile ships ("High-Mix") and moderately priced ships of a lesser capability ("Lo-Mix"). The FFG-7 Class is designed to be supported by non-traditional methods, such as minimal shipboard manning (some 100 fewer personnel than conventionally supported ships of similar size and sophistication) and progressive overhauls (eliminating periodic long overhauls).

This strategy is embodied in the following two major changes:

- Engineered Operating Cycles
- Equipment Changeout Versus Repair in Place

Figure 6-1 illustrates the operating cycle. This operating profile was developed during ship design as a directed maintenance and operating plan. A major modernization is accomplished at the end of 10 years. Within the preceding five two-year periods, planned 21-day intermediate-level availabilities (IMAVs) are scheduled twice a year. The traditional seven-to-nine-month regular overhaul (ROH) every three years is not performed. In place of the ROH is a 28-day SRA, performed every two years.

The integrated logistics support (ILS) for the FFG-7 Class ships is predicated on Lo-Mix support procedures. In keeping with the Lo-Mix concept, new techniques for logistics support of naval vessels have been developed, including logistics support analyses (LSAs) that identify maintenance requirement and attendant logistics support requirements. NAVSEA PMS-306, the Ship Support Improvement Project (SSIP) (formerly the Red E Project) was established as the primary, long-term initiative of CNO Objective No. 3, "Improvement of Material Condition in the Fleet." PMS-306 is also developing and implementing a logistics data system (LDS) to measure, monitor, and compare FFG-7 Class material condition during ship operations to the LSA



Note: This figure was extracted from the NAVSEA PMS-306 ADS Plan for the FFG-7 Class Logistics Data System (LDS), dated October 1978.

Figure 6-1. FFG-7 CLASS OPERATING CYCLES

baseline file by utilizing feedback data. This updating procedure will be accomplished through the Maintenance and Support Monitoring Subsystem (MSMS).

The MSMS, as a subsystem of the FFG-7 Class logistics data system, will have the capability to track maintenance and support actions occurring both in the Fleet and ashore, aggregate reported maintenance and support action data into usable form, measure and evaluate performance of equipments and support efforts, compare reported performance with predicted performance, determine deficiencies of integrated logistics support, and identify required ILS corrective actions. The MSMS will not include implementation of corrective action. The development of the MSMS will result in a recommended system for updating the ILS for FFG-7 Class ships. The recommended system will consist of a method for analysis of feedback information from maintenance activities.

The feedback that the MSMS receives from the Fleet will be on-line, real-time data and will be received directly from shipboard computer data terminals. These data would be of great interest to the GWSRP as real-time updated maintenance information concerning the Mk 92 Gun Fire Control System and the 76MM Mk 75 Gun Mount will be transmitted through this medium. Decisions such as changing requirements for the FFG-7 Class Maintenance Plan (CMP) will be based on the analysis of this data. The changing requirements of the CMP may directly affect the equipment for which GWSRP is responsible.

6.2.4 Amphibious EOC Program Status

The PEOC Program is a proposed new EOC program whose purpose is a re-alignment of ship maintenance strategy designed to improve the material condition of designated amphibious ships. Its objective is to maintain

combat readiness for ships in the program at an acceptable cost while maintaining or increasing their peacetime operational availability. Initially, LHA-1, LST-1179, LPH-2, and LPD-4 Classes have been identified for the PEOC Program. A basic element of the program will be the establishment of engineered maintenance and modernization plans for each of the designated classes. These class plans will identify anticipated maintenance tasks and their frequencies. Class maintenance and modernization plans will be used to forecast and assist in scheduling projected maintenance burdens on Fleet resources. The PEOC Program will provide improved planning and engineering tools to effect better maintenance management, including the optimization of ship operating cycles.

6.3 RESULTS OF INVESTIGATION

The ongoing effort to investigate potential opportunities to further improve coordination between the two programs resulted in the identification of information that directly applied to this effort. This information was obtained in the course of analyzing the BOH requirements, GWSRP and DDEOC MIS data exchange, GWSRP support to DDEOC Program site teams, and update of NAVSEAINST. 8300.2A., reported in Chapters Three through Five.

6.3.1 GWSRP and DDEOC Program Interest Areas

Interviews, documentation analysis, and previous studies identified new requirements that indicated a potential to enhance the overall interface between GWSRP and DDEOC Programs should coordination efforts be initiated. The new integration requirements identified were to (1) investigate the integration of GWSRP expertise with the additional requirements the DDEOC Program incurred from addition of the DD-963 Class, and (2) provide engineering support to integrate the ordnance update that DDEOC Program class ships will be receiving, e.g., CIWS for the CG-16 Class.

6.3.1.1 Integrate GWSRP Requirements with DD-963 Class Planning

Discussions with NAVSEA-931X indicated the DD-963 class was to be incorporated in the DDEOC Program. Work has begun on the development of a Class Maintenance Plan (CMP) for this ship class. The implementation plan for the DD-963 Class calls for this class to begin entry into DDEOC in fiscal year 1981 following each ship's first ROH. The DD-963 Class will enter the DDEOC without a baseline overhaul. To capitalize from this knowledge, the GWSRP should take the lead and provide comprehensive maintenance requirements to the DDEOC Program for the 5"/54 Caliber Gun Mount Mk 45 and the Mk 86 Gun Fire Control System. These two new systems may generate maintenance requirements different from those of their DDEOC class counterparts, the 5"/54 Caliber Gun Mount, Mk 42 Mod 9/10 and the Mk 68 Gun Fire Control Systems. It is recommended the GWSRP determine the special engineering and maintenance support requirements for the DD-963 Class gun weapon systems and coordinate them with the DDEOC Program.

6.3.1.2 Integrate Ordnance Updates

As new gun weapon systems are added to the ships of the active Fleet either through new ship acquisition or modernization, the requisite operating maintenance philosophy must be established. The DDEOC Program is experiencing additions in both categories. The addition of the Close-In Weapon System (CIWS) is part of a modernization program to upgrade ships of the CG-16 Class. These new systems have not received the engineering analysis previously applied to their counterpart systems or the systems they replaced. Therefore it is recommended that the GWSRP determine the maintenance management and engineering support required for new weapons systems, such as the CIWS, and coordinate this information with the EOC Program Office.

6.3.2 GWSRP Interest Areas

In addition to the newly identified requirements that have the potential to enhance the overall interface between GWSRP and the DDEOC Program, items of special interest to the GWSRP were identified. These items were identified in the course of discussing various integration areas within the GWSRP community:

- Investigate the Program Status of Approved OrdAlts - The identification of many systems' configurations has become exceedingly more difficult with the proliferation of accomplished approved OrdAlts. This is compounded by the number of activities that are being called upon to install OrdAlts. Records of which OrdAlts have been accomplished can be difficult to verify, depending on where the work was accomplished. It is recommended that the status of approved OrdAlts scheduled for GWSRP equipments and components be investigated.
- Investigate Feasibility of On-Line Terminal Installation for GWSRP MIS - The GWSRP Management Information System is presently managed by the Surface Weapons Systems Maintenance Branch, NOS Indian Head, for the program office. The Weapons Quality Evaluation Center, NAVWPNSTA Concord, provides the computer services required to generate the necessary reports. Shipboard inspections by the NAVSEACENS are the primary source of field data. To enhance the real-time capability of the services provided by WQEC, it has been suggested that the feasibility of installing on-line terminals at key activities for data input and retrieval be investigated. This would greatly enhance real-time response, reduce keypunch requirements, minimize data transmission errors, and generally provide for a more efficient MIS. It is recommended that the GWSRP investigate the feasibility of incorporating on-line terminals in support of the MIS and determine the program requirements necessary to implement use of this hardware.
- Investigate the Capabilities of Waterfront Facilities to Remove and Install Equipment - The ability to lift many of the GWSRP major equipments and components for removal and installation does not

exist at every repair facility. The GWSRP needs to develop a list of the necessary equipments to perform the removal and installation of GWSRP equipments/components. It is recommended that the GWSRP initiate a study of the removal and installation capabilities at designated installation sites.

- Integrate GWSRP with Emergent EOC Programs - The lessons learned and savings realized from the coordination of efforts between the GWSRP and the DDEOC Program can be applied to other EOC programs. Expressions of interest for an amphibious EOC program have been made at the CNO, NAVSEASYS COM, and TYCOM levels. Amphibious class ships contain a considerable portion of the 3"/50 caliber gun weapon population. Of 202 mounts that will be subject to the proposed OPNAV 3"/50 gun system improvement program, 123 are found on amphibious ships. It is recommended that the GWSRP establish interfaces between its program interests and those of emergent EOC programs for gun weapon systems.

CHAPTER SEVEN

STATUS OF GUN WEAPON SYSTEM REPLACEMENT PROGRAM STUDY

7.1 INTRODUCTION

The Gun Weapon System Replacement Program Coordination Effort Study has been under way since March 1978. During this period ARINC Research Corporation has performed a variety of tasks concerned with the coordination of the mutual interests between the GWSRP and DDEOC Program. The first study objective was to identify the existing and potential areas of interest to both the GWSRP and DDEOC Program and provide recommendations for integrating those interests. That study resulted in the identification of eight areas of mutual interest. Seven of those eight have been the subjects of individually tasked analyses.

This chapter provides an updated report of the status of actions accomplished and pending from all GWSRP coordination efforts accomplished up to and through this contract. It also projects the outstanding actions recommended for accomplishment to ensure that support of GWSRP-designated gun weapon systems remains technically comprehensive and ultimately responsive to Fleet requirements.

7.2 SUMMARY OF STUDIES

The Gun Weapon System Replacement Program Coordination Effort Study has been conducted under two contracts for the Manager, Surface Weapons Systems Maintenance Branch, Naval Ordnance Station, Indian Head, by ARINC Research Corporation. The first contract - N00174-78-C-0105 - was originally let for a three-month period and subsequently modified to six months. That contract resulted in two reports: one resulting from the initial three months of effort (*Gun Weapon System Replacement Program -- Coordination Effort Study*, ARINC Research Publication 1655-01-1-1779, June 1978) and one from the additional three months of effort (*A Continuation of the Gun Weapon System Replacement Program Coordination Effort Study*, ARINC Research Publication 1655-02-2-1818, October 1978). The second contract - N00174-79-C-0035 - was let for a nine-month period. Its results are the subjects of this report. This summary of efforts completed through August 1979 will address the conclusions and recommendations of all three reports.

7.2.1 Gun Weapon System Replacement Program Coordination Study - First Report

The first report was the result of three months of effort conducted from March to June 1978. That study identified eight areas of gun weapon system support in which the coordination of the GWSRP with the DDEOC Program would be likely to enhance the maintenance management support of gun weapon systems. They were:

- Gun Weapon System Pre-Overhaul Inspection Procedures
- Bid Specifications Written Prior to Gun Weapon System Overhauls
- Baseline Overhaul (BOH) Requirements
- Rotatable Pool Requirements
- Management Information System Data Exchange
- Material Condition Assessment Procedures Conducted by DDEOC Site Teams
- Class Maintenance Plan Requirements
- Program Scheduling Requirements

These areas of mutual interest were recommended for further engineering analysis to determine recommended integration action. The GWSRP managers considered all of the mutual interest areas with the exception of rotatable pool requirements to be valid requirements for further engineering analysis. The GWSRP was already sponsoring efforts to identify GWSRP rotatable pool requirements and therefore stated additional efforts in that area were not required. As of August 1979, five of the initial seven recommended areas deemed by the program managers to merit study have been the subject of engineering analysis. The remaining two, class maintenance plan requirements and program scheduling requirements, will be analyzed beginning 15 August 1979.

7.2.2 Gun Weapon System Replacement Program Coordination Study - Second Report

The second report was the result of a modification to the initial three-month contract. The initial contract was extended an additional three months for purposes of starting analyses of the specific areas of interest identified in the previous study. The objectives of this second study were divided into three specific tasks:

- Analysis of the Inspections Currently Conducted on the Gun Weapon Systems
- Analysis of the Overhaul Bid Specifications Written for Gun Weapon Systems
- Provision of Continued Support to the Overall Coordination of the GWSRP with the DDEOC Program

As a result of the conclusions reached from the analyses conducted, recommendations were made for each task area. The status of the implementation of study recommendations is shown in Table 7-1.

Table 7-1. IMPLEMENTATION STATUS OF STUDY RECOMMENDATION	
Recommendation	Action
Gun Weapon System Inspections Study	
The GWSRP and DDEOC Program managers jointly task and fund the development of standardized inspection procedures to be included in POT&I plans for designated gun weapon systems.	Initial meeting 3 April 1979
Improve POT&Is in the GWS area by including MCR, test and certification, and other procedures currently practiced but not documented.	Agreed upon 12 June 1979
Until POT&I plans are revised, schedule GWSRP MCRs to best coincide with the maintenance schedules of the DDEOC Program.	Agreed upon 12 June 1979
Revise MCRs to apply requirements of each procedural check.	Pending
The NAVSEACENS or combat systems department of naval shipyards will standardize GWS inspection procedures incorporated in the POT&I plans.	Agreed upon 12 June 1979
Use DDEOC program maintenance planning to input CSRR and CSRT results.	Pending
Correlate distribution of inspection results for GWS between the GWSRP and DDEOC Programs directly.	Agreed upon 12 June 1979
Bid Specifications Study	
The GWSRP will review GWS specifications (SI or SWI).	Pending
Use TRSS as inputs to bid specifications.	Pending
Use NOSL expertise to develop specific GWS SWIs.	Pending
Include preventive maintenance packages in gun weapon system bid specifications.	Pending
Update and specify T&C procedures.	Pending
Establish procedures for an independent observer (such as NAVSEACEN) to verify operational and material condition of GFE/GFM supplied to private shipyards.	Pending
Continuing Program Coordination	
Update NAVSEAINSTR 8300.2A	Completed 15 May 1979
Develop procedures to coordinate scheduling interfaces between programs.	Scheduled to begin 15 August 1979
Provide GWSRP updates to DDEOC CMPs.	Scheduled to begin 15 August 1979
Continue coordination efforts between GWSRP and DDEOC Programs.	Scheduled to continue through 15 August 1980
Establish integration requirements for the TSTP and T&C Program to contribute to the GWSRP and DDEOC Program.	Recommend Cancellation

The Total Ship Test Plan and the Test Certification Program are in various stages of development and implementation. They are being implemented by the TYCOMs. Their potential to provide augmented support to the GWSRP and DDEOC Program is less apparent than when initially recommended. These programs are individually tasked and chartered and could not be considered to be direct means of support. An awareness by the GWSRP and DDEOC Program of the effect of the TSTP and T&C Programs on their respective programs remains valid and necessary. A knowledge of their components, requirements, and operating procedures is necessary to avoid duplication of effort and to ensure the proper utilization of the elements of these programs as they relate to the GWSRP and DDEOC Program. Integration efforts are not considered to remain an analysis requirement.

The information in Table 7-1 shows considerable progress for the recommendations made concerning gun weapon system inspections and the continuing program coordination. The gun weapon system bid specification test area has received attention but no formal agreements have been reached to implement integration.

7.2.3 Gun Weapon System Replacement Program Coordination Study - Third Report

This report resulted from the analyses conducted under Contract N00179-79-C-0105. This nine-month effort was divided into five specific tasks that are the subjects of Chapters Two through Six. Since the conclusions and recommendations are being reported for the first time in this report, it is premature to expect any action to have been implemented. The status of the recommendations submitted in Chapter Two, Three, Four, Five, and Six are considered to be pending subject to the review of GWSRP and DDEOC Program managers. Figure 7-1 depicts the analyses completed and the projected schedule for recommended coordination efforts.

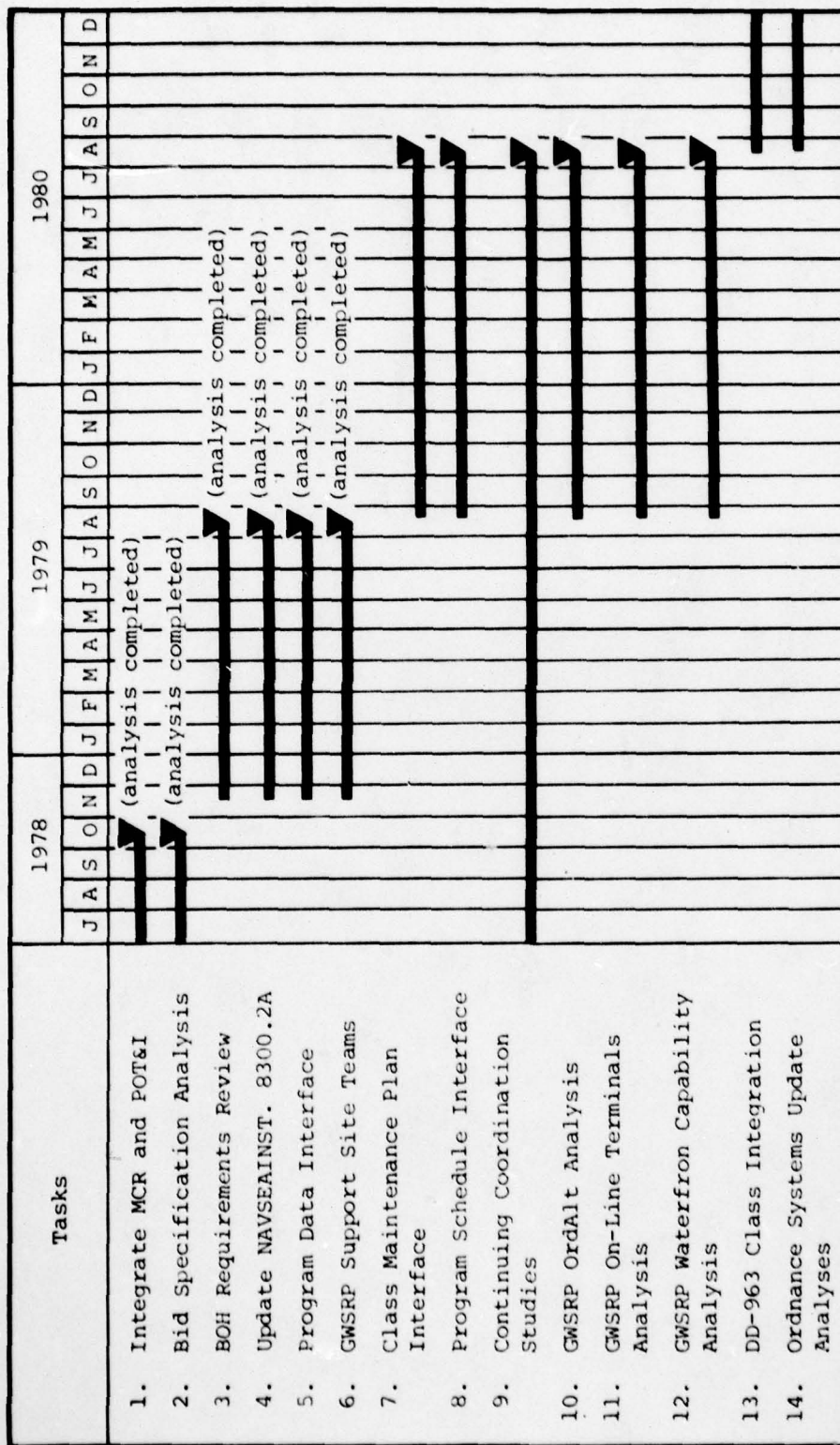


Figure 7-1. PROJECTED COORDINATION STUDY EFFORT SCHEDULE

APPENDIX A

GUN WEAPON SYSTEMS BASELINE OVERHAUL REPAIR REQUIREMENTS

The Destroyer Engineered Operating Cycle (DDEOC) repair requirements for baseline overhaul identify the repairs essential to prepare a ship of each designated class for entry into the DDEOC Program. The FF-1052, DDG-37, and CG-16 and CG-26 Class repair requirements for gun weapon systems supported by the GWSRP and DDEOC Program are contained in this section.

REPAIR PROFILE ITEMS FOR FF-1032 BOM

SUBS	REPAIR PROFILE ITEM	QTY PER SHIP	ASSIGN ST/FA	NO (est avg)	RECOMMENDATION	RATIONALE	REMARKS
472 (Cont'd)	3. <u>AM/VLR-1C Countermeasure Receiving Set</u> Accomplish Class "B" overhaul.	1		108	Baseline SARP	Repair Profile (Historical)	
	4. <u>AS-571/SLR Antenna</u> Accomplish overhaul in accordance with TR3.	1		32	Baseline SARP	Repair Profile (Historical)	
	5. <u>AS-899 B/SLR Antenna</u> Accomplish overhaul in accordance with TR3.	1		34.5	Baseline SARP	Repair Profile (Historical)	
	6. <u>C-3118A/VLR Control Indicator</u> Accomplish Class "B" overhaul.	1		11	Baseline SARP	Repair Profile (Historical)	
	7. <u>AM-1017B/SLR Magnetic Control Amplifier</u> Accomplish Class "B" overhaul.	1		11	Baseline SARP	Repair Profile (Historical)	
	8. <u>AS-616A/SLR Antenna</u> Accomplish Class "B" overhaul.	1		32.5	Baseline SARP	Repair Profile (Historical)	
473	1. <u>Regaining Switchboard</u> Accomplish Class "B" overhaul (in-place)	1		22.4	Baseline SARP	Maintenance Burden Factor Study	
481	1. <u>AM/SPC 53 Radar Set</u> a. Accomplish Class "B" overhaul b. Accomplish Class "B" overhaul of RSPF (Radar Signal Processing Equipment)	1		536	Baseline SARP	Maintenance Burden Factor Study	Include CUI Equipment on ships with AM/SPC-53 (D) O/A 6973 and 6894 Related Study

REPAIR PROFILE ITEMS FOR FF-1052 BOW

SUBS	REPAIR PROFILE ITEM	QTY PER SHIP	ASSIGN SY/FA	NO (est. avg)	RECOMMENDATION	RATIONALE	REMARKS
481 (Cont'd)	2. <u>ME 47 Computer</u> Accomplish Class "g" overhaul	1		132	Baseline SARP	Maintenance Burden Factor Study	
	3. <u>ME 68 Gun Director</u> Accomplish Class "g" overhaul	1		269	Baseline SARP	Maintenance Burden Factor Study	
	4. <u>ME 152 Digital Computer</u> Accomplish Class "g" overhaul.	1			Baseline SARP	Maintenance Burden Factor Study	
	5. <u>ME 16 Stable Element</u> Accomplish Class "g" overhaul	1		103.4	Baseline SARP	Maintenance Burden Factor Study	
	6. <u>ME 68 Gun Fire Control System</u> Perform system alignment.				Baseline SARP	TTCOM Routine	
	7. <u>ME 53 Attack Console</u> Accomplish Class "g" overhaul.	1		66.5	Baseline SARP	Maintenance Burden Factor Study	
483	2. <u>ME 363 Portable Test Set</u> Accomplish Class "g" overhaul	1		12.5	Baseline SARP	Maintenance Burden Factor Study	To be accomplished at refurbishment activity (Designated overhaul point)
	3. <u>ME 199 Launcher Captains' Control Panel</u> (LSHOC) Accomplish Class "g" overhaul				Baseline SARP	Maintenance Burden Factor Study	

REPAIR PROFILE ITEMS FOR DDG-37 B01

SMS	REPAIR PROFILE ITEM	QTY ON SHIP	ASSIGN SY/PA	MANDAY (EST AVG)	RECOMMENDATION	RATIONALE	REMARKS
472	<u>Passive ECM (Continued)</u> 11. ECM Waveguide. a. Remove, clean and paint. b. Conduct insertion and VSWR tests.	2 each			Baseline Rqmt.	Maintenance Burden Factor Study. Historical Repair Profile.	SA-DDG-37-1228K under preparation makes major modifications to the configuration.
475	<u>Deausing System</u> 1. Static Power Supplies. a. Class "B" overhaul. 2. "A" Coil Amplidyne. a. Class "B" overhaul or replace.	2 1			Baseline Rqmt. Baseline Rqmt.	Maintenance Burden Factor Study. Historical Repair Profile.	
481	<u>Gun Fire Control Systems</u> 1. MK 68 GPCB. a. Waveguide. (1) Clean and inspect.	1		4-19	Baseline Rqmt.	Maintenance Burden Factor Study.	Non-recurring repairs will be based upon the results of the POT.I.

REPAIR PROFILE ITEMS FOR DDG-37 BOW

SHBS	REPAIR PROFILE ITEM	QTY ON SHIP	ASSIGN SY/PA	MANDAY (EST AVG)	RECOMMENDATION	RATIONALE	REMARKS
481	<p><u>Gun Fire Control Systems (Continued)</u></p> <p>2. MK 68 Director.</p> <p>a. Range Finder (MK 41 or MK 75). (1) Class "B" overhaul.</p> <p>b. Train, elevation and cross level amplidyne and motors. (1) Class "B" overhaul.</p> <p>c. MK 100 Telescope. (1) Align and re-gas lenses.</p> <p>d. Cross Leve Gear Box. (1) Replace seals and gaskets.</p> <p>e. Director Hatches. (1) Replace gaskets.</p> <p>f. Conduct dummy director and error recorder checks; provide ship with new error recorder tapes.</p>	1			Baseline Rpt.	<p>Historical Repair Profile. Maintenance Burden Factor Study.</p> <p>Maintenance Burden Factor Study.</p>	
		100.					
		1					
		Var.					
		Var.		4-20			

REPAIR PROFILE ITEMS FOR DDG-37 BOM

SNBS	REPAIR PROFILE ITEM	QTY ON SHIP	ASSION SY/FA	MANDAY (EST AVG)	RECOMMENDATION	RATIONALE	REMARKS
401	<p><u>Gun Fire Control Systems (Continued)</u></p> <p>3. AN/SPG-53A Radar.</p> <p>a. Class "B" overhaul.</p> <p>4. MK 1 and MOD 1 RSPZ (Radar Signal Processing Equipment).</p> <p>a. Class "B" overhaul.</p> <p>5. MK 47 MOD 7 Computer.</p> <p>a. Class "B" overhaul.</p> <p>6. MK 116 Starehell Computer.</p> <p>a. Class "B" overhaul.</p> <p>7. MK 16 MOD 1 Stable Element (including MK 156 MOD 1 Control Panel).</p> <p>a. Class "B" overhaul.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>			<p>Baseline Rpt.</p> <p>Baseline Rpt.</p> <p>Baseline Rpt.</p> <p>Baseline Rpt.</p> <p>Baseline Rpt.</p>	<p>Historical Repair Profile. Maintenance Burden Factor Study.</p> <p>Maintenance Burden Factor Study.</p> <p>Historical Repair Profile. Maintenance Burden Factor Study.</p> <p>Historical Repair Profile. Maintenance Burden Factor Study.</p> <p>Historical Repair Profile. Maintenance Burden Factor Study.</p>	

4-21

REPAIR PROFILE ITEMS FOR DDG-37 BOH

SWBS	REPAIR PROFILE ITEM	QTY ON SHIP	ASSIGN SY/PA	MANDAY (EST AVG)	RECOMMENDATION	RATIONALE	REMARKS
481	<u>Gun Fire Control Systems (Continued)</u> 8. MK-2 Dynamic Tester. a. Class "B" overhaul. 9. MK 24 TDTs and Control Units. a. Class "B" overhaul.	1 2			Baseline Rgmt. Baseline Rgmt.	Historical Repair Profile. Historical Repair Profile.	
482	<u>Fire Control Systems (Non-Sonar Data Base)</u> 1. AN/SPG 55B Radar (Including Directors and Drives). a. Class "B" overhaul. b. Clean and inspect Waveguide; perform VSWR test. 2. MK 152 MOD 0 Computer. a. Class "B" overhaul. 3. MK 19 Digital Data Recorder. a. Class "B" overhaul.	2 1 1		4-22	Baseline Rgmt. Baseline Rgmt. Baseline Rgmt.	Maintenance Burden Factor Study. Maintenance Burden Factor Study. Maintenance Burden Factor Study.	SA DDG-37-1093 requires TYCOM funding of repairs to Radar during conversion to GMFCS MK J6 MOD B. Applies after SA DDG-37-1014K. Applies after SA DDG-37-1014K.

REPAIR REQUIREMENTS FOR BOH
(CG-16 CLASS)

SWBS	Repair Item	Qty. Per Ship	Rationale	Remarks
481	<p><u>GUN FIRE CONTROL SYSTEMS</u></p> <p>1. <u>MK 63 Gun Fire Control System</u></p> <p>Accomplish the following repairs:</p> <p>a. <u>AN/SPG-50() Radar Set</u> Class "B" overhaul.</p> <p>b. <u>MK-5 Train Parallax Corrector</u> Class "B" overhaul.</p> <p>c. <u>MK-10 FSC Amplifier</u> Class "B" overhaul.</p> <p>d. <u>MK-22 FSC Amplifier Console</u> Class "B" overhaul.</p> <p>e. <u>MK-1 Director Pedestal</u> Class "B" overhaul.</p> <p>f. <u>MK-29 Gunsight</u> Class "B" overhaul.</p>	2	<p>INSURV Discrepancy Maintenance Burden Factor Study</p> <p>Maintenance Burden Factor Study</p> <p>Maintenance Burden Factor Study</p> <p>Maintenance Burden Factor Study</p> <p>Maintenance Burden Factor Study</p> <p>Maintenance Burden Factor Study</p>	<p>When authorized SA-CG-16-9051 will remove the 3"/50 guns.</p> <p>Non-recurring repairs will be based upon the results of the POT&I.</p>

REPAIR REQUIREMENTS FOR BOH
(CG-16 CLASS)

SWBS	Repair Item	Qty. Per Ship	Rationale	Remarks
711	<p><u>GUNS</u></p> <p>1. <u>3"/50 Twin Gun Mounts</u></p> <p>Class "B" overhaul to include:</p> <p>a. <u>MK-2 Loader</u> Class "B" overhaul.</p> <p>b. <u>MK-40 Amplifier</u> Class "B" overhaul.</p> <p>c. <u>MK-25 FCS Radar Antenna Mount</u> Class "B" overhaul.</p>	2	Maintenance Burden Factor Study Historical	When authorized SA-CG-16-9051 will remove the 3"/50 guns. Non-recurring repairs will be based upon the results of the POT&I.
721	<p><u>LAUNCHING DEVICES (MISSILES AND ROCKETS)</u></p> <p>1. <u>GMLS ML 10</u></p> <p>a. MK 5 MOD 3 Launcher - Class "B" overhaul. haul.</p> <p>b. Seals - replace on blowout hatches, strikedown hatches, and blast doors.</p> <p>c. Span rails - realign.</p> <p>d. Loader rails - realign.</p> <p>e. Securing latch - realign.</p> <p>2. <u>ASROC Launcher</u></p> <p>Class "B" overhaul (to include the MK-7 Carriage and the MK-7 Guides).</p>	1	Maintenance Burden Factor Study Historical	

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F/G 19/6

A CONTINUATION OF THE GUN WEAPON SYSTEM REPLACEMENT PROGRAM C00--ETC(U)

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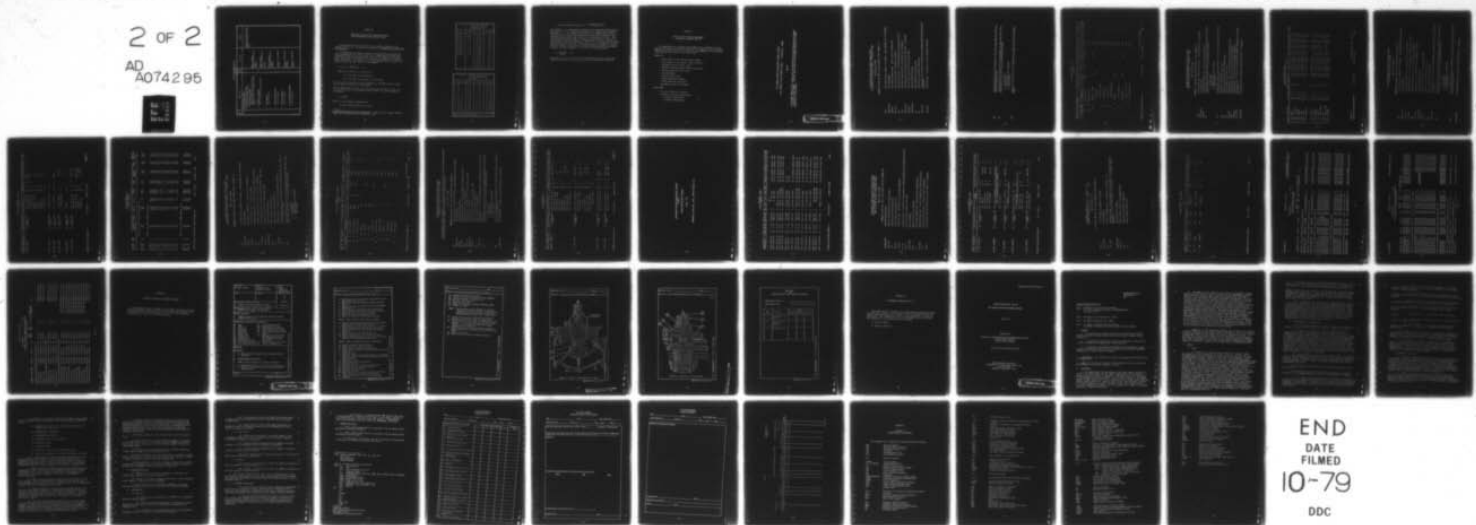
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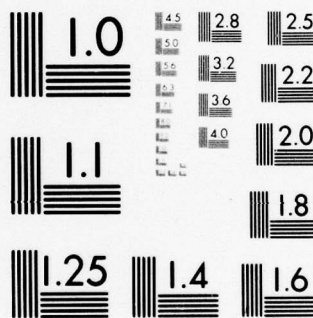
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REPAIR REQUIREMENTS FOR BOH
(CG-26 CLASS)

SWBS	Repair Item	Qty. per Ship	Rationale	Remarks
481	<p><u>GUN FIRE CONTROL SYSTEMS</u></p> <p>1. <u>MK 68 Gun Fire Control System</u> Accomplish the following repairs:</p> <p>a. <u>MK 68 Gun Fire Director</u> Class 'B' overhaul (to include the MK 2 Director Control Drive and the MK 75 Range Finder).</p> <p>b. <u>AN/SPG-53() Radar Set</u> Class 'B' overhaul (to include antenna).</p> <p>c. <u>MK 47 Computer</u> Class 'B' overhaul.</p> <p>d. <u>MK 346 Computer Test Set</u> Class 'B' overhaul.</p> <p>e. <u>MK 16 Stable Element</u> Class 'B' overhaul.</p> <p>f. <u>MK 19 Digital Data Converter</u> Class 'B' overhaul.</p>	1	<p>INSURV Discrepancy Maintenance Burden Factor Study Historical</p> <p>INSURV Discrepancy Maintenance Burden Factor Study Historical</p> <p>INSURV Discrepancy Maintenance Burden Factor Study Historical</p> <p>Maintenance Burden Factor Study</p> <p>Maintenance Burden Factor Study Historical</p> <p>Maintenance Burden Factor Study</p>	Non-recurring repairs will be based upon the results of the POT&I.

APPENDIX B

DETERMINING STATISTICAL SIGNIFICANCE USING THE NON-PARAMETRIC MANN WHITNEY U-TEST

The Mann Whitney U-test is based on the combined rankings of two samples, say D and B. The method is described in Probability and Statistics for Engineers*.

To demonstrate the method, consider the maintenance action rates for DDEOC and Baseline ships shown in Table B-1. These rates represent daily maintenance rates for the total ship. The data are placed in increasing order, maintaining the identity of the set, and the elements are ranked as shown in Table B-2. The statistic U is then computed using the sum of the ranks of one of the sets, say D, in the formula

$$U = n_1 n_2 + \frac{n_1 (n_1 + 1)}{2} - R_1$$

Where n_1 is the size of the first set

n_2 is the size of the second set

R_1 is the sum of the ranks of the first set

If ties occur, the ranks of the tied numbers are averaged and the average rank is given to each of the tied numbers.

For the data above, n_1 is 14, n_2 is 22, and R_1 is 284; thus U is 129. If n_1 and n_2 are over 8, the standard normal variable, z, can be computed by the formula

$$z = \frac{U - \mu}{\sigma}$$

Where U is the statistic computed above

μ is the expected value of $U = n_1 n_2 / 2$

*Probability and Statistics for Engineers, I. Miller and J. Freund, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1965.

Table B-1. SAMPLE DAILY MAINTENANCE
ACTION RATES FOR DDEOC
AND BASELINE SHIPS

Ship	DDEOC	Ship	Baseline
FF-1057	4.74	FF-1052	4.12
FF-1060	4.29	FF-1053	1.91
FF-1061	5.62	FF-1054	3.48
FF-1070	3.61	FF-1055	2.55
FF-1073	3.92	FF-1056	5.43
FF-1074	4.95	FF-1057	2.66
FF-1076	3.79	FF-1058	1.78
FF-1080	9.53	FF-1059	3.47
FF-1082	5.25	FF-1060	3.41
FF-1083	2.34	FF-1062	3.18
FF-1084	3.92	FF-1063	8.75
FF-1085	4.32	FF-1065	7.08
FF-1086	3.62	FF-1066	3.30
FF-1089	4.43	FF-1067	3.52
		FF-1068	6.45
		FF-1071	2.70
		FF-1072	7.19
		FF-1075	4.98
		FF-1077	1.31
		FF-1078	6.01
		FF-1079	6.62
		FF-1081	6.61

Table B-2. COMBINED RANKINGS OF DDEOC
AND BASELINE MAINTENANCE
ACTION RATES

Set	Rank	Value	Set	Rank	Value
B	1	1.31	B	19	4.12
B	2	1.78	D	20	4.29
B	3	1.91	D	21	4.32
D	4	2.34	D	22	4.43
B	5	2.55	D	23	4.74
B	6	2.66	D	24	4.95
B	7	2.70	B	25	4.98
B	8	3.18	D	26	5.25
B	9	3.30	B	27	5.43
B	10	3.41	D	28	5.62
B	11	3.47	B	29	6.01
B	12	3.48	B	30	6.45
B	13	3.52	B	31	6.61
D	14	3.61	B	32	6.62
D	15	3.62	B	33	7.08
D	16	3.79	B	34	7.19
D	17.5	3.92	B	35	8.75
D	17.5	3.92	D	36	9.53

Note: D = DDEOC, B = Baseline.

σ is the standard deviation of $U = \frac{n_1 n_2 (n_1 + n_2 + 1)}{12}$

The variable, z , is distributed according to the standard normal distribution; that is, it is normally distributed with a 0 mean and a standard deviation of 1. In a random process values of z greater than 1.28 occur 10 percent of the time, values greater than 1.64 occur 5 percent of the time, and values greater than 1.96 occur 2.5 percent of the time. Thus, if a comparison between DDEOC and baseline ships produces a value of z greater than 1.96, the difference is significant at the 97.5 percent level. The same logic applies on the negative side, i.e., 2.5 percent of the time values less than -1.96 occur. The formulas used are designed to produce positive values of z when DDEOC is better and negative values when DDEOC is worse. For this example, $\mu = 154$ and σ is 30.82. Therefore,

$$z = \frac{129 - 154}{30.82} = -.81$$

This value of z is in the range that could easily occur by chance, and therefore the sets B and D are not considered significantly different.

APPENDIX C

GWSRP AND DDEOC PROGRAM MANAGEMENT INFORMATION SYSTEMS' REPORTS

The GWSRP MIS and the DDEOC Program RMMS produce documents that are used by the respective program managers for key elements of their programs. Samples of the major reports are included in this appendix. The following lists identify the reports of the two systems:

GWSRP MIS

- Fleet Report on Gun Systems (Frogs) Annual
- Fleet Report on Gun Systems (Frogs) Quarterly
- Equipment Condition Report (ECR)
- Material Condition Review (MCR) Status Report
- Overhaul Replacement List (ORL)
- Year-End Report
- Delinquent MCR Status
- System Replacement Summary
- System/Component Replacement
- Equipment Installation Summary

DDEOC RMMS

- Periodic Maintenance Schedule
- Inventory of Periodic Maintenance
 - Schedule Requirements
 - Situation Requirements

GUN WEAPON SYSTEMS REPLACEMENT PROGRAM (GWSRP)

FLEET REPORT OF GUN SYSTEMS (FROGS) - CATALOG NO. A0820

NOTICE

THIS REPORT CONTAINS ONLY THOSE SHIPS AND RECORDS WHICH HAVE BEEN ADDED OR CHANGED IN THE PAST THREE MONTHS. REPLACE THOSE SHIPS IN THE DECEMBER REPORT WITH THOSE CONTAINED IN THIS REPORT.

GUN WEAPON SYSTEMS REPLACEMENT PROGRAM (GWSRP)
FLEET REPORT OF GUN SYSTEMS (FROGS) - CATALOG NO. A0820

DEFINITION OF TERMS

PREPARED BY CODE 384, WQEC, NAVAL WEAPONS STATION, CONCORD, CA

SHIP	SHIP TYPE AND HULL NUMBER OF THE VESSEL. MAJOR SEQUENCE KEY OF THE REPORT.
VESSEL NAME	SELF EXPLANATORY.
ACT/NRF	ACTIVE/NAVAL RESERVE FORCE. STATUS OF SHIP AT REPORT DATE.
HOME PORT	PORT TO WHICH THE SHIP IS CURRENTLY ASSIGNED.
ROH	REGULAR OVERHAUL DATE. THE NEXT SCHEDULED ROH PERIOD FOR THE SHIP.
YARD	SHIPYARD OR SUPSHIPS OFFICE IN WHICH THE ROH IS SCHEDULED.
STRIKE DATE	CNO SCHEDULED DATE FOR LEAVING ACTIVE OR NRF STATUS, IF AVAILABLE.
MARK MOD	SPECIFIC IDENTIFICATION OF THE EQUIPMENT MODEL.
NOMENCLATURE	EQUIPMENT DESCRIPTION/NAME
S/N	SERIAL NUMBER OF THE RELATED ITEM.
LOC	LOCATION OF THE EQUIPMENT ABOARD SHIP.
INSTL DATE	INSTALLATION DATE. THE DATE THE RELATED SERIAL NUMBERED EQUIPMENT WAS INSTALLED ON THE SHIP.
INSP DATE	INSPECTION DATE. THE DATE OF THE LAST NAVSEACEN INSPECTION.

ERC

RANKING FACTOR USED TO INFORM MANAGEMENT OF THE TOTAL SYSTEM CONDITION IDENTIFIED BY THE MCR SUMMARY REPORT.

MCL

RANKING FACTOR USED TO IDENTIFY THE TYPE AND SEVERITY OF CONDITIONS FOUND DURING ACCOMPLISHMENT OF THE MCR. THE FOLLOWING CODES ARE ASSIGNED:

- 1 - NO WORK NEEDED
- 2 - SHIPS FORCE
- 3 - DOCKSIDE TECHNICAL ASSISTANCE
- 4 - DEPOT OVERHAUL

UPDT

ASTERISK INDICATES THAT LINE OF INFORMATION HAS CHANGED SINCE THE LAST QUARTERLY REPORT.

GWSRP
FLEET REPORT OF OWN SYSTEMS
ATLANTIC
MAR 79

SHIP: FF 1093 USS CAPODANNO		ACT HOME PORT: MAYPT ROM: 07/19/83 - 04/14/84 YARD: PHILA NAT INSP:				STRIKE:		
MARK MOD	NOMENCLATURE	S/N	LOC	INSTL DATE	INSP DATE	ERC	WCL	UPDT
42	9 MOUNT, 5/54 SGL SF	13620	51	78/12	78/12	1	1	
68	13 FIRE CONT SYS, GUN	-			77/05	2	2	
53	F RADAR SET, AN/SPG	114		78/12	76/12		1	
1	1 RSPE CABINET	347			77/05		1	
1	1 RSPE CONTROL SUPPLY				77/05		1	
53	F RADAR CONSOLE				77/05		1	
53	F HV POWER SUPPLY				77/05		1	
53	F TRANSMITTER/RECEIVER				77/05		1	
47	11 COMPUTER	132		73/11	77/05		2	
47	11 CONTROL AMPLIFIER				77/05		1	
16	2 STABLE ELEMENT	223		73/11	77/05		1	
16	2 STABLE ELEM CTRL PNL				77/05		1	
16	2 RATE TRANSMIT MK 36				77/05		1	

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GUN WEAPON SYSTEMS REPLACEMENT PROGRAM (GWSRP)
EQUIPMENT CONDITION REPORT - CATALOG NO. A0830

DEFINITION OF TERMS

PREPARED BY CODE 384, WQEC, NAVAL WEAPONS STATION, CONCORD, CA

SHIP	SHIP TYPE AND HULL NUMBER OF THE VESSEL. MAJOR SEQUENCE KEY OF THE REPORT.
VESSEL NAME	SELF EXPLANATORY.
ACT/NRF	ACTIVE/NAVAL RESERVE FORCE. STATUS OF SHIP AT REPORT DATE.
MCL	RANKING FACTOR USED TO IDENTIFY THE TYPE AND SEVERITY OF CONDITIONS FOUND DURING ACCOMPLISHMENT OF THE MCR. THE FOLLOWING CODES ARE ASSIGNED:
	1 - NO WORK NEEDED
	2 - SHIPS FORCE
	3 - DOCKSIDE TECHNICAL ASSISTANCE
	4 - DEPOT OVERHAUL
ERC	RANKING FACTOR USED TO INFORM MANAGEMENT OF THE TOTAL SYSTEM CONDITION IDENTIFIED BY THE MCR SUMMARY REPORT.
LOC	LOCATION OF THE EQUIPMENT ABOARD SHIP.
MCD	SPECIFIC IDENTIFICATION OF THE EQUIPMENT MODEL.
S/N	SERIAL NUMBER OF THE RELATED ITEM.
ROH DATE	REGULAR OVERHAUL DATE. THE NEXT SCHEDULED ROH PERIOD FOR THE SHIP.
YARD	SHIPYARD OR SUPSHIPS OFFICE IN WHICH THE ROH IS SCHEDULED.
INSP DATE	INSPECTION DATE. THE DATE OF THE LAST NAVSEACEN INSPECTION.
INSTL DATE	INSTALLATION DATE. THE DATE THE RELATED SERIAL NUMBERED EQUIPMENT WAS INSTALLED ON THE SHIP.
STRIKE DATE	CNO SCHEDULED DATE FOR LEAVING ACTIVE OR NRF STATUS, IF AVAILABLE.

G W S R P
EQUIPMENT CONDITION REPORT
MOUNT, 5/54 SGL RF MARK 42 MOD 9

SHIP ID	VESSEL NAME	A/N	MCL	ERC	LOCATION	MOD	SERIAL #	ROH	DATES	YARD	INSP	DT	INST	DT	HOME	PT	STRIKE
FF 1079	BOWEN	ACT	3	2	51	13636	80/05/01	-	81/05/01	SEKN	79/02	71/05	CHASN				
FF 1059	W S SIMS	ACT	2	2	51	13619	79/05/03	-	80/04/02	SEOST	77/11	70/01	MAYPT				
FF 1090	AINSWORTH	ACT	2	2	51	12654	83/12/01	-	84/10/01	SEOST	77/11	73/04	PHILA				
FF 1094	PHARRIS	ACT	2	2	51	13661	79/09/15	-	79/08/15	SEBATH	77/07	74/02	BATH				
FF 1095	TRUETT	ACT	2	2		13662	78/03/26	-	79/08/26	SEOST	78/06	74/07	SESN				
FF 1096	VALDEZ	ACT	2	2		13641	78/09/15	-	79/08/15	SEOST	78/01	74/09	SESN				
FF 1097	WJIMESTER	ACT	2	2		13656	79/09/04	-	80/09/04	SEKN	79/02	74/11	NORVA				
FF 1081	AYLWIN	ACT	2	1	51	13642	80/04/30	-	81/04/30		79/04	71/03	CHASN				
FF 1056	CONNOLLE	ACT	1	1	51	13630	83/10/14	-	84/09/14	SEOST	79/04	79/04	BATH				
FF 1068	VREELAND	ACT	1	1	51	13660	80/07/01	-	81/07/01	SEKN	78/02	78/02	MAYPT				
FF 1072	BLAKELY	ACT	1	1	51	13634	79/06/01	-	80/05/02	SEKN	77/08	70/07	CHASN				
FF 1078	JOSEPH HEWES	ACT	1	1	51	12632	81/05/04	-	82/03/04	CHASN	77/10	71/04	CHASN				
FF 1080	PAUL	ACT	1	1	51	13617	81/11/17	-	82/11/17	SEKN		77/10	MAYPT				
FF 1092	THOMAS C HART	ACT	1	1	51	13659	78/09/26	-	79/03/09	PHILA	77/06	73/07	PHILA				
FF 1093	CAPODANNO	ACT	1	1	51	13620	83/07/19	-	84/04/14	PHILA		78/12	BATH				

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GUN WEAPON SYSTEMS REPLACEMENT PROGRAM (GWSRP)
MCR STATUS - CATALOG NO. A0833

DEFINITION OF TERMS

PREPARED BY CODE 384, WQEC, NAVAL WEAPONS STATION, CONCORD, CA.

SHIP TYPE AND HULL NUMBER OF THE VESSEL. MAJOR SEQUENCE KEY OF THE REPORT.

SELF EXPLANATORY.

ACTIVE/NAVAL RESERVE FORCE. STATUS OF SHIP AT REPORT DATE.

REGULAR OVERHAUL DATE. THE NEXT SCHEDULED ROH PERIOD FOR THE SHIP.

SHIPYARD OR SUPSHIPS OFFICE IN WHICH THE ROH IS SCHEDULED.

INSPECTION DATE. THE DATE OF THE LAST NAVSEACEN INSPECTION.

EQUIPMENT DESCRIPTION/NAME.

SPECIFIC IDENTIFICATION OF THE EQUIPMENT MODEL.

LOCATION OF THE EQUIPMENT ABOARD SHIP.

SERIAL NUMBER OF THE RELATED ITEM.

INSTALLATION DATE. THE DATE THE RELATED SERIAL NUMBERED EQUIPMENT WAS INSTALLED ON THE SHIP.

RANKING FACTOR USED TO IDENTIFY THE TYPE AND SEVERITY OF CONDITIONS FOUND DURING ACCOMPLISHMENT OF THE MCR. THE FOLLOWING CODES ARE ASSIGNED:

- 1 - NO WORK NEEDED
- 2 - SHIPS FORCE
- 3 - DOCKSIDE TECHNICAL ASSISTANCE
- 4 - DEPOT OVERHAUL

RANKING FACTOR USED TO INFORM MANAGEMENT OF THE TOTAL SYSTEM CONDITION IDENTIFIED BY THE MCR SUMMARY REPORT.

CNO SCHEDULED DATE FOR LEAVING ACTIVE OR NRF STATUS, IF AVAILABLE.

SHIP

VESSEL NAME

ACT/NRF

ROH DATES

YARD

INSP DATE

NOMENCLATURE

MARK MOD

LOC

S/N

INSTL DATE

MCL

ERC

STRIKE DATE

G W S R P
MATERIAL CONDITION REVIEW STATUS
MAR 79

SHIP ID	VESSEL NAME	A/N	CH	DATES	YARD	INSP	DT	NOMENCLATURE	MARK	MOD	LOC	SER	NR	INST	DT	MCL	ERC	STRIKE
CG 0034	BIDDLE	ACT	79/10/01	PHILA	80/10/03			MOUNT, 3/50 SGL RF	34	1	31	20941						
								MOUNT, 3/50 SGL RF	34	1	32	20932						
								FIRE CONT SYS, GUN	68	8		-						
								RADAR SET, AN/SPG	53	A		131						
								COMPUTER	47	9		67						
								COMPUTER	116	4		46						
								DIRECTOR, GUN	68	3		113						
								STABLE ELEMENT	16	2		79						
LST 1181	SUMTER	ACT	79/12/04	SPORT	80/06/28			TGT DESIGNATION SYS	1	26		-						
DD 0940	MANLEY	ACT	80/01/15	PHILA	81/01/15			MOUNT, 5/54 SGL RF	42	7	51	13555						
DD 0943	BLANDY	ACT	80/01/15	SBOST	81/01/15			COMPUTER, STARHELL	1	7		707	76/09					
								TGT DESIGNATION SYS	5	7		56						
DDG 0045	DENEY	ACT	80/02/01	CHASN	81/02/03			COMPUTER	116	0		10						
FF 1075	TRIPPE	ACT	80/02/15	SBOST	81/02/17			MOUNT, 5/54 SGL RF	42	9	51	13637	70/09					
								FIRE CONT SYS, GUN	60	14		-						
								RADAR SET, AN/SPG	53	D		BNT-27	70/09					
								COMPUTER	47	10		101	70/09					
								DIRECTOR, GUN	68	7		140	70/09					

COMSURFLANT
PAGE: 2

DATE: 28 MAR 79 PRODUCT ID: A0833

PREPARED BY WPNSTA CONCORD, CA.

GU. COUNTS
OVERHAUL REPLACEMENT LIST
ACTIVE - PACIFIC
JUL 76 - JUN 77

SHIP TYPE HULL NO.	EQUIP POP	MOS. SINCE OVERHAUL/ REPLACEMENT	CASREPTS X SEVERITY	PARTS COST (\$)	ORI VALUES/EQUIPMENT POP			MISSION CAPABILITY FACTOR	ROUNDS FIRED	OVERHAUL REPLACEMENT INDEX (ORI)
					MANHOURS	DEFERRAL DAYS	MTBCM (DAYS)			
MOUNT, 5 IN. 54 CAL. SINGLE RF MK 42 MODS 0-8										
DDG 33	1	122		4857	1130	1040.0	.302	216	85.6	
DDG 36	2	89		185	15	237.5	.302	173	69.4	
CV - 61	2	61		553			.073	250	61.4	
MOUNT, 5 IN. 54 CAL. SINGLE RF MK 42 MOD 9										
FF 1064	1	105		3116	3071	305.0	.275	396	72.7	
FF 1066	1	74		2158	9999	244.0	.275	201	67.3	
FF 1064	1	86		25509	93	579.0	.275	291	66.6	
FF 1077	1	65		20738	409	269.0	.275	594	65.2	
FF 1063	1	48		1862	1260	964.0	.435	811	62.8	
FF 1062	1	70		13798	458	180.0	.275	1500	61.7	
FF 1067	1	70		3898	126	678.0	.275	317	61.3	
FF 1063	1	97		10714	134		.275	956	60.9	
FF 1063	1	53		3534	409	711.0	.275	882	69.7	
FF 1074	1	62		2021	182	780.0	.275	348	60.3	
FF 1062	1	91		2573	87	268.0	.275	265	57.6	
FF 1067	1	44		14873	231		.275	357	54.0	
FF 1065	1	54		3342	322	161.0	.275	352	51.5	
FF 1066	1	65		1321	55		.275	443	51.0	
FF 1057	1	85		2162	5		.275	1125	50.5	
FF 1033	1	58		176	248	228.0	.275	205	47.4	
FF 1070	1	58		252	719	51.0	.275	41	46.6	
FF 1073	1	45		1502	294	234.0	.275	398	45.5	
FF 1063	1	43		421	126	420.0	.275	433	44.1	
FF 1060	1	54		350	175	4.0	.275	75	44.0	
FF 1065	1	52		627			.275	450	44.0	
FF 1066	1	47		2523	173	126.0	.275	1128	42.8	
FF 1071	1	66		1209	13	152.0	.275	181	40.6	
MOUNT, 5 IN. 54 CAL. SINGLE RF MK 42 MOD 10										
DDG 34	1	29		7548	1313	1973.0	.302	369	75.7	
DDG 21	2	37		1128	186	362.5	.353	62	74.8	
DDG 8	2	49		5158	214	168.5	.353	393	72.3	
CG 32	1	46		9991	499	1.0	.317	299	66.3	
DDG 9	2	38		1447	186	236.5	.353	537	66.3	
CG 31	1	29		1953	108	530.0	.317	816	65.5	

PREPARED BY WOEC, NAVAL WEAPONS STATION, CONCORD, CALIF

DATE: 24 MAR 78

CATALOG NO: A0802

PAGE: 1

GUN WEAPON SYSTEMS REPLACEMENT PROGRAM (GWSRP)
FLEET REPORT OF GUN SYSTEMS INSPECTED - CATALOG NO. A0832

DEFINITION OF TERMS

PREPARED BY CODE 384, WQEC, NAVAL WEAPONS STATION, CONCORD, CA

SHIP	SHIP TYPE AND HULL NUMBER OF THE VESSEL. MAJOR SEQUENCE KEY OF THE REPORT.
VESSEL NAME	SELF EXPLANATORY.
ACT/NRF	ACTIVE/NAVAL RESERVE FORCE. STATUS OF SHIP AT REPORT DATE.
HOME PORT	PORT TO WHICH THE SHIP IS CURRENTLY ASSIGNED.
ROH	REGULAR OVERHAUL DATE. THE NEXT SCHEDULED ROH PERIOD FOR THE SHIP.
YARD	SHIPYARD OR SUPSHIPS OFFICE IN WHICH THE ROH IS SCHEDULED.
STRIKE DATE	CNO SCHEDULED DATE FOR LEAVING ACTIVE OR NRF STATUS, IF AVAILABLE.
MARK MOD	SPECIFIC IDENTIFICATION OF THE EQUIPMENT MODEL.
NOMENCLATURE	EQUIPMENT DESCRIPTION/NAME
S/N	SERIAL NUMBER OF THE RELATED ITEM.
LOC	LOCATION OF THE EQUIPMENT ABOARD SHIP.
INSP DATE	INSPECTION DATE. THE DATE OF THE LAST NAVSEACEN INSPECTION.
ERC	RANKING FACTOR USED TO INFORM MANAGEMENT OF THE TOTAL SYSTEM CONDITION IDENTIFIED BY THE MCR SUMMARY REPORT.
MCL	RANKING FACTOR USED TO IDENTIFY THE TYPE AND SEVERITY OF CONDITIONS FOUND DURING ACCOMPLISHMENT OF THE MCR. THE FOLLOWING CODES ARE ASSIGNED:
	1 - NO WORK NEEDED
	2 - SHIPS FORCE
	3 - DOCKSIDE TECHNICAL ASSISTANCE
	4 - DEPOT OVERHAUL

OWSAP
FLEET REPORT OF GUN SYSTEMS INSPECTED
ATLANTIC
MAR 79

SHIP: DD 943 USS BLANDY		ACT HOME PORT: NORVA		RCH: 01/15/80 - 01/15/81		YARD: SBOST NAT INSP:		STRIKE:	
MARK MOD	NOMENCLATURE	S/N	LOC	INSL DATE	INSP DATE	ERC MCL	UPDT		
42 10	MOUNT, 5/54 SGL RF	13516	51	76/01	78/05	2	2		
42 10	MOUNT, 5/54 SGL RF	13588	52	76/01	78/05	2	2		
56 47	FIRE CONT SYS, GUN	586	31		78/05	2	3		
30 22	COMPUTER	953			78/05		2		
42 22	COMPUTER	297		78/01	78/05		1		
4 18	CONSOLE	586			78/05		1		
56 8	DIRECTOR, GUN	875		76/11	78/05		1		
60 5	FIRE CONT SYS, GUN	-			78/05	4	4		
53 -	RADAR SET, AN/SPG	9			78/05		4		
47 4	COMPUTER	9		76/11	78/05		2		
68 0	DIRECTOR, GUN	10			78/05		4		
16 0	STABLE ELEMENT	2			78/05		3		
68 5	OTHER FC MODULES				78/05				

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PREPARED BY WQEC WFNSTA CONCORD, CA.

DATE: 23 MAR 79

PRODUCT ID: A0832

DD 943 USS BLANDY

PAGE: 13

GUN WEAPON SYSTEMS REPLACEMENT PROGRAM (GWSRP)
DELINQUENT MCR STATUS - CATALOG NO. A0834

For ships with an overhaul scheduled in the next twelve months, this report lists those systems/equipments that either haven't been inspected or the inspection is over one year old.

DEFINITION OF TERMS

PREPARED BY CODE 384, WQEC, NAVAL WEAPONS STATION, CONCORD, CA.

SHIP TYPE AND HULL NUMBER OF THE VESSEL. MAJOR SEQUENCE KEY OF THE REPORT.

SELF EXPLANATORY.

ACTIVE/NAVAL RESERVE FORCE.

REGULAR OVERHAUL DATE. THE NEXT SCHEDULED ROH PERIOD FOR THE SHIP.

SHIPYARD IN WHICH THE ROH IS SCHEDULED.

INSPECTION DATE. THE DATE OF THE LAST NAVSEACEN INSPECTION.

EQUIPMENT DESCRIPTION/NAME.

SPECIFIC IDENTIFICATION OF THE EQUIPMENT MODEL.

LOCATION OF THE EQUIPMENT ABOARD SHIP.

SERIAL NUMBER OF THE RELATED ITEM.

INSTALLATION DATE. THE DATE THE RELATED SERIAL NUMBERED EQUIPMENT WAS INSTALLED ON THE SHIP.

RANKING FACTOR USED TO IDENTIFY THE TYPE AND SEVERITY OF CONDITIONS FOUND DURING ACCOMPLISHMENT OF THE MCR. THE FOLLOWING CODES ARE ASSIGNED:

- 1 - NO WORK NEEDED
- 2 - SHIPS FORCE
- 3 - DOCKSIDE TECHNICAL ASSISTANCE
- 4 - DEPOT OVERHAUL

RANKING FACTOR USED TO INFORM MANAGEMENT OF THE TOTAL SYSTEM CONDITION IDENTIFIED BY THE MCR SUMMARY REPORT.

CNO SCHEDULED DATE FOR LEAVING ACTIVE OR NRF STATUS, IF AVAILABLE.

SHIP
VESSEL NAME
ACT/NRF
ROH DATES
YARD
INSP DATE
NOMENCLATURE
MARK MOD
LOC
S/N
INSTL DATE
MCL
ERC
STRIKE DATE

G W S R P
DELINQUENT MCR STATUS
MAR 79

SHIP ID	VESSEL NAME	A/N	ROH	DATES	YARD	INSP	DT	NOMENCLATURE	MARK	MOD	LOC	SER	NR	INST	DT	MCL	ERC	STRIKE
---------	-------------	-----	-----	-------	------	------	----	--------------	------	-----	-----	-----	----	------	----	-----	-----	--------

DDG 0039	MACDONOUGH	ACT	79/05/18	CHASN	77/05	MOUNT, 5/54	SGL	RF	42	10	51	13570	74/05	2	2			
			80/05/16		77/05	FIRE CONT	SYS.	GUN	68	6		-		1	1			
					77/05	RADAR SET, AN/SPG			53	A		119			1			
					77/05	COMPUTER			47	7		38			1			
					77/05	COMPUTER			116	0		17			1			
					77/05	DIRECTOR, GUN			68	2		24	74/03	1				
					77/05	STABLE ELEMENT			16	1		34			1			
					77/05	OTHER FC MODULES			68	6								

FF 1072	BLAKELY	ACT	79/06/01	SBKN	77/08	MOUNT, 5/54	SGL	RF	42	9	51	13634	70/07	1	1			
			80/05/02		77/08	FIRE CONT	SYS.	GUN	68	14		-		1	1			
					77/08	RADAR SET, AN/SPG			53	F		BNT-23	70/07	1				
						COMPUTER			47	11		97						
					77/08	DIRECTOR, GUN			68	7		139	70/07	1				
					77/08	STABLE ELEMENT			16	2		108	70/07	3				
					77/08	OTHER FC MODULES			68	14								
						TGT DESIGNATION SYS			1	19		-						

LPD 0014	TRENTON	ACT	79/06/01	SPORT	78/05	MOUNT, 3/50	TWIN	RF	33	13	31	21163		2	2			
			80/04/01		78/05	MOUNT, 3/50	TWIN	RF	33	0	34	21480		2	2			

DD 0941	DUPONT	ACT	79/06/15	SBKN	78/04	MOUNT, 5/54	SGL	RF	42	10	51	13600	75/08	2	2			
			80/04/15		78/04	MOUNT, 5/54	SGL	RF	42	10	52	13524	75/08	2	2			

PREPARED BY WPNSTA CONCORD, CA.

DATE: 28 MAR 79 PRODUCT ID: A0834

COMSURLANT
PAGE: 2

**GUN WEAPON SYSTEMS REPLACEMENT PROGRAM
(GWSRP)**

SYSTEM REPLACEMENT SUMMARY

MARCH 1979

PREPARED BY CODE 384, WQEC, WPNSTA CONCORD, CA.

G W S R P
SYSTEM REPLACEMENT SUMMARY
MAR 79

NOMENCLATURE	MARK	MOD	LOC	SER	NR	INSP	MCL	INST	SHIP ID	VESSEL NAME	TYCOM A/N	ROH DATES	YARD	STRIKE
ERC 4														
MOUNT, 5/54 SGL RF	42	7	51	13502	76/12	4		DD	0937	DAVIS	LANT ACT	79/09/15 - 80/08/15	CHASN	
MOUNT, 5/54 SGL RF	42	7	52	13496	76/12	4		DD	0937	DAVIS	LANT ACT	79/09/15 - 80/08/15	CHASN	
MOUNT, 5/54 SGL RF	42	9	51	13612	79/01	4		89/05	FF	1053 ROARK	PAC ACT	79/11/05 - 80/10/03	SSEAT	
MOUNT, 5/54 SGL RF	42	9	51	13622	78/10	4		78/12	FF	1064 LOCKWOOD	PAC ACT	79/08/03 - 80/07/02	YOKO	
MOUNT, 5/54 SGL RF	42	9	51	13630	77/11	4		70/06	FF	1068 VREELAND	LANT ACT	80/07/01 - 81/07/01	SBKN	
MOUNT, 5/38 TWIN	38	1	51	1323	78/02	4		87/09	DD	0784 MCKEAN	PAC NRF	-		
MOUNT, 5/38 TWIN	38	1	52	1206	78/02	4		84/02	DD	0784 MCKEAN	PAC NRF	-		
MOUNT, 5/38 TWIN	38	4	52	13410	77/11	4		85/10	DD	0718 HANNER	PAC NRF	79/02/05 - 79/03/16	SSEAT	
MOUNT, 5/38 TWIN	38	11	51	1566	77/09	4		68/12	DD	0788 HOLLISTER	PAC NRF	79/01/22 - 79/03/02	SLB	
MOUNT, 5/38 TWIN	38	11	52	9020	77/09	4		77/07	DD	0788 HOLLISTER	PAC NRF	79/01/22 - 79/03/02	SLB	
MOUNT, 5/38 TWIN	38	12	51	11627	77/11	4		85/10	DD	0718 HANNER	PAC NRF	79/02/05 - 79/03/16	SSEAT	
MOUNT, 5/38 SGL MW	30	94	3-0	3904	78/10	4		74/11	FFG	0001 BROOKE	PAC ACT	79/11/15 - 80/09/15	LBCH	
MOUNT, 5/38 SGL MW	30	96	51	3777	78/08	4		75/05	FF	1041 BRADLEY	PAC ACT	79/07/09 - 80/05/09	SLB	
MOUNT, 5/38 SGL LT	30	73	52	10504	77/05	4				CGN 0009 LONG BEACH	PAC ACT	80/10/01 - 82/10/01	PUGET	
MOUNT, 5/38 SGL LT	30	73	51	10503	77/05	4				CGN 0009 LONG BEACH	PAC ACT	80/10/01 - 82/10/01	PUGET	
MOUNT, 3/50 TWIN RF	33	0	31	21170	78/12	4		72/03	AE	0021 SURIBACHI	LANT ACT	79/04/02 - 79/12/03	SBKN	

GUN WEAPON SYSTEMS REPLACEMENT PROGRAM (GWSRP)
 SYSTEM REPLACEMENT SUMMARY - CATALOG NO. A0835
 INDEX TO SYSTEM/COMPONENT REPLACEMENT REPORT

DEFINITION OF TERMS

PREPARED BY CODE 384, WQEC, NAVAL WEAPONS STATION, CONCORD, CA.

NOMENCLATURE	SYSTEM DESCRIPTION/NAME.
MARK MOD	SPECIFIC IDENTIFICATION OF THE SYSTEM MODEL.
LOC	LOCATION OF THE SYSTEM ABOARD SHIP.
SER NR	SERIAL NUMBER OF THE RELATED ITEM.
INSP DT	INSPECTION DATE. THE DATE OF THE LAST SEACEN INSPECTION.
INST DT	INSTALLATION DATE. THE DATE THE RELATED SERIAL NUMBERED EQUIPMENT WAS INSTALLED ON THE SHIP.
SHIP ID	SHIP TYPE AND HULL NUMBER OF THE VESSEL.
VESSEL NAME	SELF EXPLANATORY.
TYCOM	OCEAN TO WHICH SHIP IS ASSIGNED.
A/R	ACTIVE/NAVAL RESERVE FORCE. STATUS OF SHIP AT REPORT DATE.
RCH DATES	REGULAR OVERHAUL DATE. THE NEXT SCHEDULED ROH PERIOD FOR THE SHIP.
YARD	SHIPYARD OR SUPSHIPS OFFICE IN WHICH THE ROH IS SCHEDULED.
STRIKE	CNO SCHEDULED DATE FOR LEAVING ACTIVE OR NRF STATUS, IF AVAILABLE.

G. S. R. P.
SYSTEM/COMPONENT REPLACEMENT
MAR 78

SHIP ID	VESSEL NAME	TYCOM A/N	ROH DATES	YARD	INSP DT	NOMENCLATURE COMMENTS	MARK MOD	LOC	SER NR	INST DT	ERC	ESL	STRIKE
FF 1090	AINSWORTH	LANT	ACT 78/05/15 79/03/01	PHILA	77/11	FIRE CONT SYS. GUN	68	13			3	1	
					77/11	COMPUTER	47	11	125	73/04	4	1	
					77/11	DIRECTOR, GUN	68	3	174	73/04	4	1	
					77/11	AMPLIDYNE, TEAC	68	3			4	1	
					77/11	STABLE ELEMENT	16	2	243	73/04	4	1	
LSD 0036	ANCHORAGE	PAC	ACT 78/04/14 78/10/16	LBCH	77/02	MOUNT, 3/50 TWIN RF GUN PORT SHIELDS ON BOTH GUNS ARE WORN OUT. REPLAC EMENT IS RECOMMENDED BECAUSE OF ECONOMICS	33	13	31	21374 68/12	3	1	
					77/02	SHIELD ASSY	33	13			4	0	
FF 1088	BARBEY	PAC	ACT 78/01/23 78/12/15	LBCH	77/03	MOUNT, 5/54 SGL RF	42	9	51	13652 73/11	3	3	
					77/03	CRADLES RIGHT CRADLE NEEDS REPLACING	42	9			4	0	
DDG 0015	BERKELEY	PAC	ACT 77/07/13 78/06/28	PUGET	76/09	FIRE CONT SYS. GUN	68	4			3	1	
					76/09	RADAR CONSOLE REPLACE RADAR CONSOLE UNIT 6H SAME THING	53	A			4	0	
					76/09	DIRECTOR, GUN	68	3	47		4	0	
					76/09	AMPLIDYNE, TEAC	68	3			4	0	
DD 0942	BIGELOW	LANT	ACT 78/09/12 79/08/11	SBNK	77/06	MOUNT, 5/54 SGL RF	42	7	53	13539 74/03	3	5	
					77/06	TRANSFER TRAYS	42	7			4	0	

PREPARED BY WQEC WPNSTA CONCORD, CA

DATE: 12 MAR 78

PRODUCT ID: A0836

PAGE: 1

GUN WEAPON SYSTEMS REPLACEMENT PROGRAM (GWRP)
EQUIPMENT INSTALLATION SUMMARY - CATALOG NO. A0337

DEFINITION OF TERMS

PREPARED BY CODE 384, WQEC, NAVAL WEAPONS STATION, CONCORD, CA

SHIP ID	SHIP TYPE AND HULL NUMBER OF THE VESSEL.
VESSEL NAME	SELF EXPLANATORY.
A/N	ACTIVE/NAVAL RESERVE FORCE STATUS OF SHIP AT REPORT DATE.
INSTL DATE	INSTALLATION DATE. THE DATE THE RELATED SERIAL NUMBERED EQUIPMENT WAS INSTALLED ON THE SHIP. WHEN EXACT DATE DURING WHICH IS UNKNOWN THE FINAL MONTH OF ROH IS REFLECTED.
NOMENCLATURE	EQUIPMENT DESCRIPTION/NAME.
MARK MOD	SPECIFIC IDENTIFICATION OF THE EQUIPMENT MODEL.
LOC	LOCATION OF THE EQUIPMENT ABOARD SHIP.
S/N	SERIAL NUMBER OF RELATED ITEM.

G W S R P
EQUIPMENT INSTALLATION SUMMARY
FY :
PAC

SHIP ID	VESSEL NAME	A/N	INSTL DATE	MOVING	MARK	MOD	LOCATION	SERIAL #
CG 32	W M STANDLEY	ACT	11/78	DIRECTOR, GUN	58	3		37
LPD 9	DENVER	ACT	12/78	MOUNT, 3/50 TWIN RF	33	0	31	20240
FF 1058	MEYERKORD	ACT	01/79	DIRECTOR, GUN	68	3		53

CSPR LOCATION -

REPORT DATE - 10/26/76

NEXT CUT-OFF DATE
NEXT REPORT DESIRED BY

USS PATTERSON FT 1061

PERIODIC MAINTENANCE SCHEDULE
FOR CUT-OFF DATE 06/01/81

EQUIPMENT & TASK NAME	APL/CID	MRC/TRS	PER	LAST ACCOMP	MEAT DATE	ACT M MSD L	P I	D D	R P	U H	MASTER JOB CATALOG NO.	TAN
SWABS-5241 SWABS ACPCNCLATURE-AUXILIARY SEA WATER SYSTEM												
W/O HLD SW MS VLV TST	NCNE RECD	NCNE RECD	012	10/06/76	10/06/77	3-6	1	2			N0360 EXEC J080	001001
W/HLC SW MS VLV TST	NCNE RECD	NCNE RECD	012	10/06/76	10/06/77	3-6	1	2			N0360 EXEC J081	001002
SWABS-5291 SWABS ACPCNCLATURE-DRAINAGE & BALLASTING SYSTEM - PIPING												
W/HLC MN DRN SW H/VLV	NCNE RECD	NCNE RECD	036	10/06/76	10/06/77	0-5	1	2			N0360 EXEC J082	001001
W/O HLD MN DRN H/VLV	NCNE RECD	NCNE RECD	012	10/06/76	10/06/77	3-6	1	2			N0360 EXEC J083	001002
SWABS-5311 SWABS ACPCNCLATURE-FLASH TYPE DISTILLING PLANT												
01 DIST RVLV TST (3)	NCNE RECD	NCNE RECD	036	10/06/76	10/06/77	0-5	1	2			N0360 EXEC J091	001309
02 DIST RVLV TST (3)	NCNE RECD	NCNE RECD	036	10/06/76	10/06/77	0-5	1	2			N0360 EXEC J091	002309
01 MCT SW MTR DR P CVHL	17475-2400	5311-086-622	036	08/26/77	08/25/80	0-2	1	2			N0360 EXEC J087	01P006
02 PUMP SW MTR DR P CVHL	17475-2400	5311-086-622	036	08/26/77	08/25/80	0-2	1	2			N0360 EXEC J087	01P006
01 MCT SW MTR DR P CVHL	17475-2400	5311-086-622	036	08/26/77	08/25/80	0-2	1	2			N0360 EXEC J087	01P006
02 PUMP SW MTR DR P CVHL	17475-2400	5311-086-622	036	08/26/77	08/25/80	0-2	1	2			N0360 EXEC J087	01P006
01 EVAP 1ST STG DMST CLN	NCNE RECD	NCNE RECD	030	10/06/76	04/07/79	0-8	1	2			N0360 EXEC J084	101002
02 EVAP 2ND STG DMST CLN	NCNE RECD	NCNE RECD	030	10/06/76	04/07/79	0-8	1	2			N0360 EXEC J084	102002
01 EVAP 1ST STG DMST CLN	NCNE RECD	NCNE RECD	030	10/06/76	04/07/79	0-8	1	2			N0360 EXEC J084	201002
02 EVAP 2ND STG DMST CLN	NCNE RECD	NCNE RECD	030	10/06/76	04/07/79	0-8	1	2			N0360 EXEC J084	202002
SWABS-5331 SWABS ACPCNCLATURE-PCTABLE WATER SERVICE												
W/O HLD VLV SNTL RLF TST	NCNE RECD	NCNE RECD	012	10/06/76	10/06/77	3-6	1	2			N0360 EXEC J093	001002
W/HLC VLV SNTL RLF TST	NCNE RECD	NCNE RECD	036	10/06/76	10/06/77	0-5	1	2			N0360 EXEC J093	001003
W/HLC VLV SNTL RLF TST	NCNE RECD	NCNE RECD	036	10/06/76	10/06/77	0-5	1	2			N0360 EXEC J093	001004
01 MCT FW SVC PMP CL B	17475-2358	054	054	10/06/76	04/07/81	0-0	1	2			N0360 EXEC J092	01P001
02 MCT FW SVC PMP CL B	17475-2358	054	054	10/06/76	04/07/81	0-0	1	2			N0360 EXEC J092	01P001
01 PMP FW SVC PMP CL B	17475-2358	054	054	10/06/76	04/07/81	0-0	1	2			N0360 EXEC J092	02P001
02 PMP FW SVC PMP CL B	17475-2358	054	054	10/06/76	04/07/81	0-0	1	2			N0360 EXEC J092	02P001
SWABS-5341 SWABS ACPCNCLATURE-ALX. STEAM SYS. - PIPING & CNTNLS IN MACH. SPACES												
W/O ALX AS DSMTA TST	NCNE RECD	NCNE RECD	012	10/06/76	10/06/77	3-6	1	2			N0360 EXEC J096	002008
W/HLC AS DSMTA TST	NCNE RECD	NCNE RECD	012	10/06/76	10/06/77	3-6	1	2			N0360 EXEC J096	003008

CSMP LOCATION -

REPORT DATE - 10/26/78

NEXT CUT-OFF DATE

USS PATTERSON

FF 1061

INVENTORY OF PERIODIC MAINTENANCE REQUIREMENTS
PART I - SCHEDULED REQUIREMENTS

EQUIPMENT & TASK NAME	APL/CIC	MPC/TRS	PER	LAST ACCOMP DATE	NEXT DUE DATE	M L	R I	D U	R O P H	MASTER JOB CATALOG NO.	TAN
B/HV VLV SNTL RLF TST	NCNE RECD	NCNE RECD	030	10/06/76	10/06/79	1	2			NO360 EXEC J094	021003
M1 MTR M/VLV STM TST	NCNE RECD	NCNE RECD	030	10/06/76	10/06/79	1	2			NO360 EXEC J095	010004
01 MTR FM SVC PMP CL B	174752358	NCNE RECD	034	10/06/76	04/07/81	1	2			NO360 EXEC J092	010001
01 PMP FM SVC CL B	C1C150607	NCNE RECD	034	10/06/76	04/07/81	1	2			NO360 EXEC J092	010001
02 MTR FM SVC PMP CL B	174752358	NCNE RECD	034	10/06/76	04/07/81	1	2			NO360 EXEC J092	024001
02 PMP FM SVC CL B	C1C153607	NCNE RECD	034	10/06/76	04/07/81	1	2			NO360 EXEC J092	024001

SWABS-5341 SWABS NCPENCLATURE-AUX. STEAM SYS. - PIPING & CONTROLS IN MACH. SPACES

1AS10 VLV CL B SUUT PLM	082055989	NCNE RECD	060	08/26/77	08/26/82	0	2				001001
1AS10 RECR BVP VLV CL B	082141300	NCNE RECD	060	08/26/77	08/26/82	0	2				001003
1AS10 RECR IMV VLV CL B	082054425	NCNE RECD	060	08/26/77	08/26/82	0	2				001006
MT ALM AS DSHTR TST	NCNE RECD	NCNE RECD	012	10/06/76	10/06/77	1	2			NO360 EXEC J096	002008
TRMST AS CSHTA TST	NCNE RECD	NCNE RECD	012	10/06/76	10/06/77	1	2			NO360 EXEC J096	003009
1AS10 VLV CL B CPMSM CL B	082054425	NCNE RECD	060	08/26/77	08/26/82	0	2				004005
1AS10 VLV CL B CPMSM CL B	082054425	NCNE RECD	060	08/26/77	08/26/82	0	2				004005
1A1 FLD GRD VLV CL B	082054425	NCNE RECD	060	08/26/77	08/26/82	0	2				1A1002
1AS10 AUX STP VLV CL B	082054425	NCNE RECD	060	08/26/77	08/26/82	0	2				1A1004
1A2 FDB GRD VLV CL B	082054425	NCNE RECD	060	08/26/77	08/26/82	0	2				1A2002
1AS10 AIR MOTOR CL B	RECLHED	NCNE RECD	060	10/06/76	10/06/81	0	2				1A2004
1B1 FCB GRD VLV CL B	082055989	NCNE RECD	060	08/26/77	08/26/82	0	2				1A1002
1AS10 AUX STP VLV CL B	082054425	NCNE RECD	060	08/26/77	08/26/82	0	2				1A1004
1B2 FCB GRD VLV CL B	082055989	NCNE RECD	060	08/26/77	08/26/82	0	2				1A2002
1AS10 AIR MOTOR CL B	RECLHED	NCNE RECD	060	10/06/76	10/06/81	0	2				1A2004
1AS10 R/INL VLV CL B	082141299	NCNE RECD	060	08/26/77	08/26/82	0	2				1A1007
1AS10 R/INL VLV CL B	082055112	NCNE RECD	060	08/26/77	08/26/82	0	2				1A1007

SWABS-5345 SWABS NCPENCLATURE-FRESH WATER DRAIN COLLECTING SYSTEM

FW DR CLING TNR UT	NCNE RECD	NCNE RECD	040	10/06/76	10/06/80	1	2			NO360 EXEC J099	001002
01 FWDK MCT CVHL	174752505	NCNE RECD	034	10/06/76	04/07/81	1	2			NO360 EXEC J099	010001
01 FM DR PMP CVHL	016020862	2552-0800-035	034	10/06/76	04/07/81	1	2			NO360 EXEC J097	010001
02 FLARP MOT CVHL	174752505	NCNE RECD	034	10/06/76	04/07/81	1	2			NO360 EXEC J098	024001
02 FM DR PMP CVHL	016020862	2552-0800-035	034	10/06/76	04/07/81	1	2			NO360 EXEC J097	024001

SWABS-5346 SWABS NCPENCLATURE-ELECTRONIC EQUIPMENT COOLING WATER SYSTEM

ELEC AT EXCHG C/CLN FT	NCNE RECD	NCNE RECD	030	10/06/76	10/06/79	1	2			NO360 EXEC J100	001001
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SWABS-5347 SWABS NCPENCLATURE-FUELS FUEL & FUEL COMPENSATING SYSTEM

FU TRANS PMP CL B	016100740	NCNE RECD	034	10/06/76	04/07/81	1	2			NO360 EXEC J101	001001
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REPORT DATE = 10/26/78

USS PATTERSON FF 1061
INVENTORY OF PERIODIC MAINTENANCE REQUIREMENTS
PART II - SITUATION REQUIREMENTS

EQUIPMENT & TASK NAME	APL/CIC	MHC/TRS	PER	LAST ACCOMP DATE	NEXT DUE DATE	P K L	U R D	B H P	MASTER JUB C A T A L O G N U .	TAN
SWABS REPENDCLATURE-AIR CLNCTICNING PLANT										
#1 A/C PLT OVHL	22500305	5142-086-601	M03	10/06/76	U 2					001002
#2 A/C PLT OVHL	22500305	5142-086-601	M03	10/06/76	U 2					002002
#3 A/C PLT OVHL	22500305	5142-086-601	M03	10/06/76	U 2					003002
SWABS REPENDCLATURE=SHIPS SERVICE REFRIGERATION										
#1 REEFER PLT OVHL	043010181	5161-086-600	M03	08/26/77	U 2					001001
#2 REEFER PLT OVHL	043010181	5161-086-600	M03	08/26/77	D 2					002001
#1 MCT R/PLT OVHL	174751258	5161-086-601	M03	08/26/77	U 2					01M001
#2 MCT R/PLT OVHL	174751258	5161-086-601	M03	08/26/77	D 2					02M001
SWABS REPENDCLATURE=FLASH TYPE DISTILLING PLANT										
#1 METER CLN/CAL DSTLT	NCNE RECD	NCNE RECD	M03	10/06/76	1 2				N0360 EXEC J090	001008
#2 METER CLN/CAL DSTLT	NCNE RECD	NCNE RECD	M03	10/06/76	1 2				N0360 EXEC J090	002008
#1CISLT PMF MCT OVHL	174751209	5311-086-622	M03	08/26/77	1 2				N0360 EXEC J085	01M004
#1 MCT FD SW PUMP OVHL	174752411	5311-086-622	M03	08/26/77	1 2				N0360 EXEC J086	01M005
#1DISILT PMP OVHL	016150528	5311-086-621	M03	08/26/77	1 2				N0360 EXEC J085	01P004
#1 FEED PMP SW OVHL	016150580	5311-086-621	M03	08/26/77	1 2				N0360 EXEC J086	01P005
#2CISLT PMP MCT OVHL	174751209	5311-086-622	M03	08/26/77	1 2				N0360 EXEC J085	02M004
#2 MCT FD SW PUMP OVHL	174752411	5311-086-622	M03	08/26/77	1 2				N0360 EXEC J086	02M005
#2DISILT PMP OVHL	016150528	5311-086-621	M03	08/26/77	1 2				N0360 EXEC J085	02P004
#2 FEED PMP SW OVHL	016150580	5311-086-621	M03	08/26/77	1 2				N0360 EXEC J086	02P005
#1EVAP 1ST STG UNST REP	C60C3C051	NCNE RECD	M03	08/26/77	D 2					101001
#1EVAP 2ND STG UNST REP	C60C3C051	NCNE RECD	M03	08/26/77	D 2					102001

APPENDIX D

MATERIAL CONDITION ASSESSMENT PROCEDURE

This appendix presents an example of the format utilized for Material Condition Assessment (MCA) procedures. The specific MCA procedure is for the condenser water regulating valve, which is one of the subsystems inspected on the ship's air conditioning system.

SHIP SYSTEM Air Conditioning	SUBSYSTEM Condenser Water Regulating Valve	MRC CODE DDEOC SITE TEAM MCA PROCEDURE																									
SYSTEM	EQUIPMENT	RATES	M/H																								
MAINTENANCE REQUIREMENT DESCRIPTION		TOTAL M/H																									
1. Inspect regulating valve(s) internals.		ELAPSED TIME																									
Ship Applicability: FF-1052 Class: Vendor: Marsh/Penn: <u>APL/CID</u> : 88 210 1602																											
Safety Precautions 1. Comply with Navy Safety Precautions for Forces Afloat, OPNAVINST 5100 Series.																											
Tools, Parts, Materials, Test Equipment <table border="0"> <tr> <td>1. Rags</td> <td>13. 12" Adjustable wrench</td> </tr> <tr> <td>2. Bucket</td> <td>14. Circle and hole cutter</td> </tr> <tr> <td>3. Wire strap</td> <td>15. 8" Normal duty screwdriver</td> </tr> <tr> <td>4. Flashlight</td> <td>16. 4/16", 9/16" Gasket punches</td> </tr> <tr> <td>5. Wire brush</td> <td>17. 1/16" Gasket material, Symbol 2150</td> </tr> <tr> <td>6. Safety tags</td> <td>18. Refrigerant leak detector, TIF Instruments-Model 440 (to be provided by DDEOC Site Team).</td> </tr> <tr> <td>7. Bottle brush</td> <td>19. Copy of attached Data Sheet</td> </tr> <tr> <td>8. 24 gauge wire</td> <td>20. 1/8" x 3" Round Stock</td> </tr> <tr> <td>9. Flange scraper</td> <td></td> </tr> <tr> <td>10. 6" Slip-joint pliers</td> <td></td> </tr> <tr> <td>11. 1/2" drive Socket set</td> <td></td> </tr> <tr> <td>12. 1-lb. Ball peen hammer</td> <td></td> </tr> </table>				1. Rags	13. 12" Adjustable wrench	2. Bucket	14. Circle and hole cutter	3. Wire strap	15. 8" Normal duty screwdriver	4. Flashlight	16. 4/16", 9/16" Gasket punches	5. Wire brush	17. 1/16" Gasket material, Symbol 2150	6. Safety tags	18. Refrigerant leak detector, TIF Instruments-Model 440 (to be provided by DDEOC Site Team).	7. Bottle brush	19. Copy of attached Data Sheet	8. 24 gauge wire	20. 1/8" x 3" Round Stock	9. Flange scraper		10. 6" Slip-joint pliers		11. 1/2" drive Socket set		12. 1-lb. Ball peen hammer	
1. Rags	13. 12" Adjustable wrench																										
2. Bucket	14. Circle and hole cutter																										
3. Wire strap	15. 8" Normal duty screwdriver																										
4. Flashlight	16. 4/16", 9/16" Gasket punches																										
5. Wire brush	17. 1/16" Gasket material, Symbol 2150																										
6. Safety tags	18. Refrigerant leak detector, TIF Instruments-Model 440 (to be provided by DDEOC Site Team).																										
7. Bottle brush	19. Copy of attached Data Sheet																										
8. 24 gauge wire	20. 1/8" x 3" Round Stock																										
9. Flange scraper																											
10. 6" Slip-joint pliers																											
11. 1/2" drive Socket set																											
12. 1-lb. Ball peen hammer																											
Procedure Preliminary a. Wire applicable isolation valves shut and tag "Do Not Open." 1. <u>Inspect Regulating Valve(s)</u> NOTE 1: Refer to Figure 1 for steps a. through i. a. Remove drain plug (pc 24) and drain regulating valve. b. Close off R-12 actuating line valve and disconnect actuating line.																											
LOCATION		DATE																									

PAGE 1 of 6

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AC-2

MAINTENANCE REQUIREMENT CARD (MRC)
11ND NAVSEA/CEN-PAC 4703 119-751

Ship Name and No. _____ Date _____

Equipment R-12 Air Conditioning Plant #1, #2 and #3

- c. Remove capscrews and left valve cap assembly (pc 30) from head assembly (pc 34).
- d. Remove head bolts and left head assembly from body (pc 45).
- e. Remove main valve disc-holder (pc 40) and diaphragm assembly (pc 17).
- f. Clean diaphragm; inspect for tears and fraying.
- g. Clean main valve seat and disc (pc 22) and inspect mating surfaces for pitting and grooves.
- h. Remove main valve boot housing (pc 38).
- i. Remove and clean main valve packing assembly.

NOTE 2: Refer to Figure 2 for steps j. through o.

- j. Inspect packing assembly for pitting; inspect rubber boot (pc 5B) for fraying and distortion.
- k. Clean pilot valve seat (pc 33) and disc (pc 35) and inspect mating surfaces for pitting and grooves.
- l. Loosen seal nut (pc 7) and slide free on push-pin (pc 5A).
- m. Remove locknut (pc 29) and yoke (pc 28).
- n. Remove and clean pilot valve packing assembly.
- o. Inspect packing assembly for pitting; inspect rubber boot (pc 53) for fraying and distortion.

NOTE 3: Refer to Figure 1 for steps p. through ak.

- p. Remove plug (pc 8) from valve cap.
- q. Remove plug (pc 12) from valve head.
- r. Remove strainer assembly from valve body.
- s. Clean internal passages in valve body, valve head, and valve cap.
- t. Clean valve body.
- u. Clean and inspect internal metallic parts for erosion, corrosion, galling or wear which could adversely affect valve operation.
- v. Reinstall ejector.
- w. Clean flanges and mating surfaces.
- x. Reinstall strainer.
- y. Reinstall plugs in valve head and valve cap.
- z. Reinstall pilot valve packing assembly.
- aa. Reinstall yoke and locknut.
- ab. Reinstall seal nut.
- ac. Reinstall main valve packing assembly, pilot valve disc, push-pin, and main valve boot housing.
- ad. Reinstall main valve disc-holder and diaphragm assembly.

PAGE 2 OF 6

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AC-2

MAINTENANCE REQUIREMENT CARD (MRC)
11ND NAVSEA/CNPA 4700 219 751

Ship Name and No. _____

Date _____

Equipment R-12 Air Conditioning Plant #1, #2 and #3

- ae. Reinstall head assembly on body.
- af. Install new gasket; reinstall valve cap assembly.
- ag. Install new gaskets; reinstall valve.
- ah. Reconnect actuating line.
- ai. Reinstall drain plug.
- aj. Remove wire and open applicable isolation valves.
- ak. Inspect for leaks.

NOTE 4: Turn adjustment screw clockwise to increase refrigerant discharge pressure. Turn adjustment screw counterclockwise to reduce refrigerant discharge pressure using 1/8" x 3" Round Stock.

- al. Adjust valve to maintain 120-125 psig refrigerant discharge pressure using 1/8" x 3" Round Stock.
- am. Record results of valve inspection and final pressure setpoint. List the Part Number of pieces that were replaced on the attached Data Sheet and identify repairs that were necessary.
- an. Report completion of this inspection to cognizant engineering officer and provide results to DDEOC Site Team.
- ao. Remove safety tags.
- ap. Restore system to desired readiness condition.

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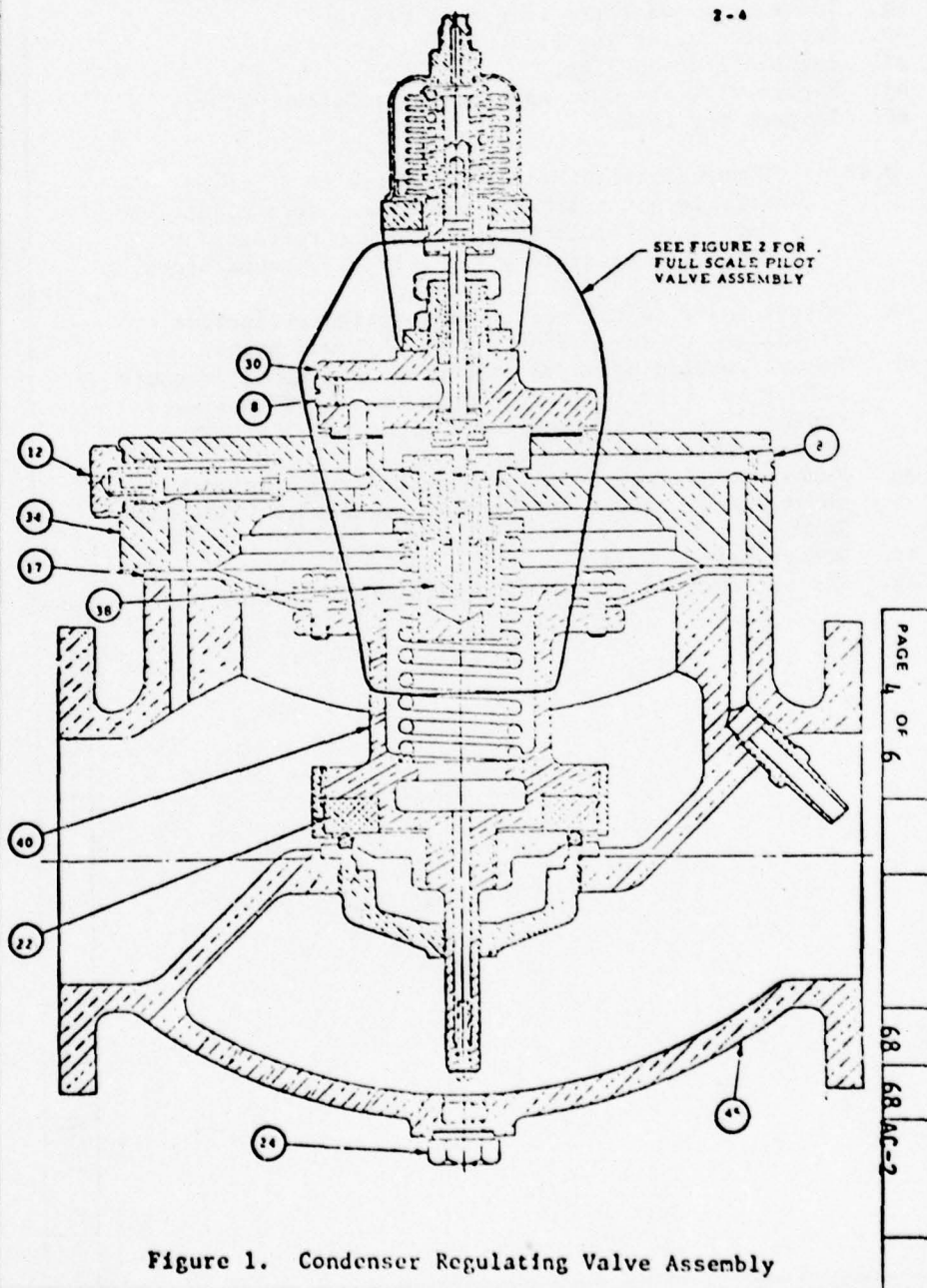
68

AC-2

MAINTENANCE REQUIREMENT CARD (MRC)
11ND NAVSEACINPAC 4700 2-9 75

Ship Name and No. _____ Date _____

Equipment R-12 Air Conditioning Plant #1, #2 and #3



MAINTENANCE REQUIREMENT CARD (MRC)
11ND NAVSEA ACENPAC 4700 2 (9 75)

Ship Name and No. _____ Date _____

Equipment R-12 Air Conditioning Plant #1, #2 and #3

2-5

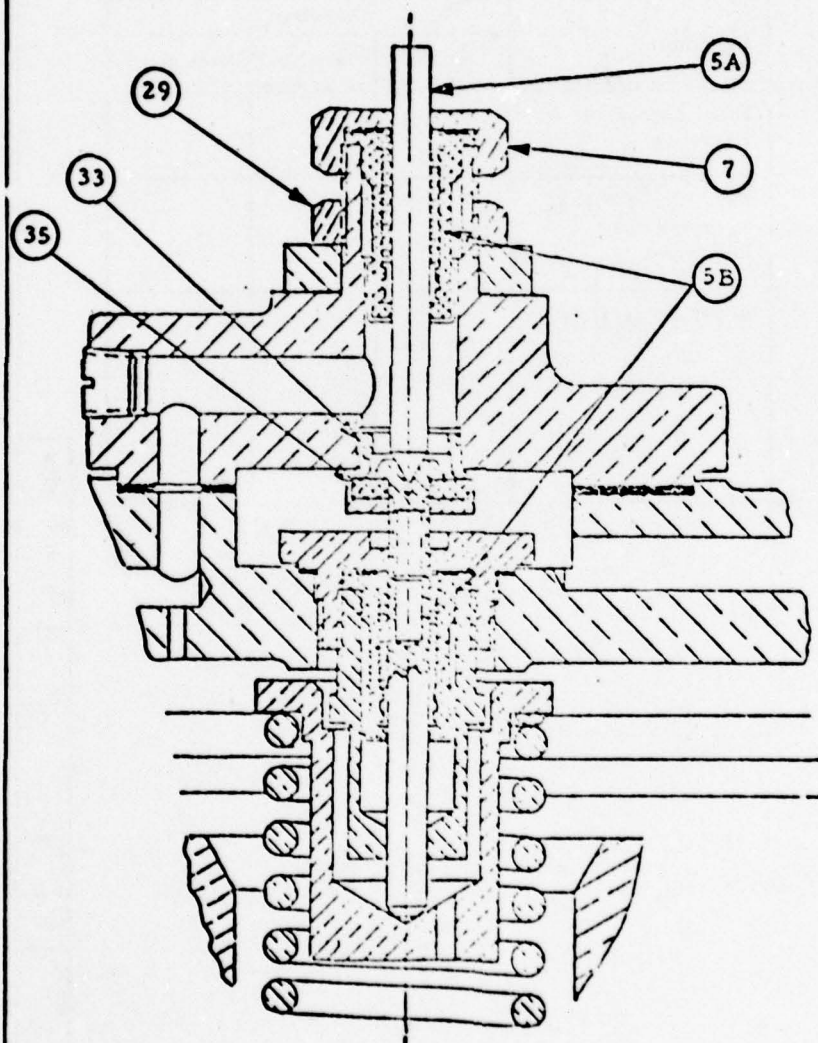


Figure 2. Pilot Valve Detail Assembly

MAINTENANCE REQUIREMENT CARD (MRC)
1140 NAVSEALCEN PAC 4700 2 (9 75)

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**DATA SHEET
FOR
WATER REGULATING VALVE INTERNAL INSPECTION**

SHIP NAME AND HULL NO. _____

DATE ACCOMPLISHED _____

Item No.	Parameter	Results		
		Plant No. 1	Plant No. 2	Plant No. 3
1	Final Comp. Disch. Pressure			
2	Part No. of Pieces Replaced during Inspection			
3	Repairs Required			

PAGE 6 OF 6
68 68 AC-2

MAINTENANCE REQUIREMENT CARD (MRC)
11ND NAVSEACENPAC 4700 2-9 751

APPENDIX E

RECOMMENDED NAVSEAINST 8300.2B

NAVSEAINST 8300.2A "Gun Weapon System Replacement Program" prescribes the policy and procedures for the GWSRP. Recent decisions affecting gun weapon system maintenance have resulted in the requirement to update the instruction. The recommended version of NAVSEAINST 8300.2B is provided. The annotations on the margins mean the following:

A = material added

R = material rewritten

NAVSEA INSTRUCTION 8300.2B
GUN WEAPON SYSTEM REPLACEMENT PROGRAM

May 1979

Prepared for
Director, Surface Weapon System Maintenance Division
Naval Ordnance Station
Indian Head, Maryland

Under Contract N00174-79-C-0035

ARINC Research Corporation
A Subsidiary of Aeronautical Radio, Inc.
2551 Riva Road
Annapolis, Maryland 21401

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NAVSEAINST 8300.2B
SEA 62YG/SHR
SER.

NAVSEA INSTRUCTION 8300.2B

From: Commander, Naval Sea Systems Command
To: All Offices Reporting Directly to COMNAVSEASYS
Distribution List

Subj: Gun Weapon System Replacement Program

Ref: (a) NAVSUP Publication 4107 (MRIL)

Encl: (1) Sample, Equipment Inspection Report
(2) Sample, Gun Weapon System Replacement Program Schedule

1. Purpose

a. To establish policy and procedures for implementing Gun Weapon System Replacement Program (GWSRP) and to define areas of funding responsibilities.

b. To establish procedures for developing requirements planning data for the Gun Weapon System Replacement Program Schedule.

c. To integrate and implement Gun Weapon System Replacement Program policies and material condition review procedures with Destroyer Engineered Operating Cycle (DDEOC) Overhaul Programs. (A)

2. Cancellation. This instruction cancels and supersedes NAVSEAINST 8300.2A of 24 March 1979.

3. Scope. All In-service Gun Weapon Systems installed in Active Fleet and Naval Reserve Training (NRT) category "A" ships.

4. Discussion

a. The GWSRP exists for the purpose of replacing ordnance installed on active fleet (O&MN funded) and NRT (O&MNR funded) ships with overhauled/ properly configured systems or components. The GWSRP covers the replacement of any equipment, noted in paragraph 3, that requires overhaul or replacement because of major deterioration of the equipment wiring, piping, metal stability, valves, control units, etc. caused by usage or age. The replacement of major 2J cognizant components (receiver-regulator, power drives, control panels, etc.) vice equipment replacement, is to be included in the GWSRP as an element designated, "component replacement".

R)

b. The GWSRP for each fiscal year is based on Type Commander (TYCOM) requirements and reports of Naval Sea Support Center (NAVSEACEN) equipment Material Condition Reviews (MCR) within the constraints of industrial capacity, ship availability and material/equipment availability. Since the program budget and industrial workload schedules are predicated on planned requirements submitted by TYCOMs, subsequent deviation from the basic schedule (e.g., substitution of ships because of change in overhaul schedules or a change in equipment to be replaced) shall require justification for change and citation of appropriate compensation from the current Gun Weapon System Replacement Program Schedule. Requirements generated by other maintenance programs which increase previously planned GWSRP workload requirements shall require justification and appropriate equipment compensation or other funding sources should be identified. Naval Sea Systems Command (NAVSEASYSKOM) will be responsible for funding the overhaul of equipments and for technical assistance during removal, installation, test and checkout to meet program requirements within the aforementioned constraints. TYCOMs will be responsible for funding removal and installation of equipments plus the additional costs incurred as a result of TYCOM requested changes to the current Gun Weapon System Replacement Program Schedule.

A)

c. Commencing in FY80, GWSRP MCR procedures will be used as the standard inspection procedure for both GWSRP overhaul candidates as well as for destroyer-installed gun weapon systems planned for repair at shipyard facilities. Pre-overhaul Test and Inspections (POT&I) will be scheduled by the Planning and Engineering for Repairs and Alterations Office, Cruisers-Destroyers [PERA(CD)]. These POT&I requirements for gun weapon systems will be integrated with GWSRP inspection schedules in a manner that precludes duplicate inspections/reviews.

5. Action

a. TYCOM:

R)

(1) Forward, by 1 February (with an update by 1 August), GWSRP requirements for both replacement and inspection for FY+1 and FY+2 (FY+1 and FY+2 being the two years following the year in which the submission is made) to NAVSEASYSKOM (SEA 62YG, 05M/62F, and 074) with copy to NAVORDSTA Indian Head (Code 5033), NAVORDSTA Louisville (Code 20X), appropriate NAVSEACEN and appropriate PERA. For an equipment to be considered a valid requirement for induction into the GWSRP it must have had a material condition review conducted, the results of which must indicate that the equipments require depot overhaul vice repair at the intermediate and organizational levels. Completed material condition reviews will be required for those equipments requested in the first six months of FY+1 and a planned inspection date for those equipments requested in the last six months of FY+1. Completed material condition reviews are required for the latter by submission of 1 August update. MCRs for those equipments programmed for replacement during a ship's Regular Overhaul (ROH) or Baseline Overhaul (BOH) will be coordinated with the appropriate PERA and, as required, the appropriate Ship Logistics Manager (SLM). The results of the MCR will provide the inputs for both the GWSRP and the pre-overhaul work requirements incorporated by PERA into the proposed Ship Alteration and Repair Packages (SARPs). Final determination of equipments to be inducted into the GWSRP will be the subject of the GWSRP workload meeting to be held semi-annually at NAVORDSTA Louisville.

(2) Forward changes to replacement requirements for FY+1 on current FY delivery schedule to NAVSEASYSKOM (SEA 62YG) with copy to NAVSEASYSKOM (05M/62F and 074), appropriate NAVSEACEN, NAVORDSTA Indian Head (Code 5033), (R)

NAVORDSTA Louisville (Code 20X) and the appropriate PERA citing justification and appropriate compensation. Program cost increase due to TYCOM initiated changes will be identified by NAVSEASYSKOM (SEA 62YG) and borne by TYCOM. Changes to replacement requirements for FY+2 will be discussed at the semi-annual GWSRP workload meeting.

(3) Is responsible for all aspects (to include funding) incident to the removal, installation, test and checkout of GWSRP replacement systems. TYCOM will designate, at the time of final shipping destination selection, a technical coordinator for each GWSRP installation/removal action. Tentatively, NAVORDSTA Louisville representative will be used for installation in Naval shipyards and 5"/54 gun mounts and NAVSEACENS for all others. TYCOM will inform all concerned (tender, Mobile Technical Unit [MOTU], installing activity, other program participants) of the designation the specific tasks/responsibilities of the coordinator and authorize the coordinator direct liaison with the principal fleet activities involved. (R)

b. NAVSEACENLANT and NAVSEACENPAC:

(1) Will provide NAVSEASYSKOM (SEA 62YG) representation and general liaison to the TYCOM and the waterfront on matters relating to the GWSRP. (R)

(2) Forward to the appropriate TYCOM and NAVORDSTA Indian Head (Code 5033) by 1 April (with subsequent 1 October update), with copy to NAVSEASYSKOM (SEA 62YGB), NAVORDSTA Louisville (Code 20X) and appropriate PERA, an inspection schedule based on TYCOMs' FY+1 and FY+2 inspection requirements. In scheduling material condition reviews for those equipments programmed for replacement during a ship's ROH/BOH the scheduled date for inspection shall precede the work definition conference. The cognizant PERA should be contacted and the material condition review made in conjunction with the ship's POT&I when possible. Additionally, coordination should be made such that a single inspection of the gun weapon system serves to fulfill the requirements of both the MCR and POT&I. The results of the MCR must provide sufficient input to the PERA's for purpose of planning proposed SARPS. (R)

(3) Conduct material inspections using the MCR format of enclosure (1) for those gun weapon systems approved on the current fiscal year inspection schedule. Results of completed material condition reviews will be forwarded to the appropriate TYCOM with copies to NAVORDSTA Indian Head (Code 5033) and NAVSEASYSKOM (SEA 62YGB). (R)

(4) Coordinate POT&I Material Condition Review requirements directly with PERA(CD).

(5) When designated by TYCOM as technical coordinator for removal/installation of equipments/components under the GWSRP, perform the following: (R)

(a) Provide technical assistance in the removal of equipment to be refurbished or scrapped and preparation of the site receiving the refurbished equipment. For equipments to be removed for refurbishment, insure documentation describing equipment removal is made available to ship's force prior to initiating removal. (R)

- A) (b) Coordinate the retention of equipments to be removed prior to overhaul with the ship's force and NOS Louisville. Ensure proper storage of removed equipments.
- (c) Deliver all documents and identify appropriate OP/ODs pertaining to the installation of the refurbished equipment to the installing activity.
- (d) Monitor and inform all concerned of the actual shipment of refurbished equipment including progress, delays and arrival dates.
- (e) Conduct with the installing activity an onsite inspection of equipment upon arrival to ascertain equipment condition and shortages.
- (f) Take appropriate action to obtain items identified as shortages.
- (g) Provide technical assistance during the installation and checkout of refurbished equipment.
- (h) Report completion of installation, documenting ship's equipment configuration in accordance with OPNAVINST 4790.4 via OPNAV 4790/2K form.
- R) (6) Review the material condition of equipment being replaced via the GWSRP prior to removal action to determine the equipments "reworkability." Based on review, provide recommendation to NAVSEASYSCOM (SEA 61F) to return equipment to overhaul pipeline, retain for cannibalization, or scrape.
- R) (7) In response to disposition instructions from NAVSEASYSCOM (SEA 61F), provide direction and funding to Naval Supply Centers to insure proper packing, crating and handling of equipment being returned for the GWSRP pipeline. Actions in response to those equipments being retained for cannibalization or scrapping will be addressed and funded by NAVSEASYSCOM (SEA 61F) or the appropriate inventory manager.
- c. NAVORDSTA, Louisville:
- R) (1) Forward to NAVSEASYSCOM (SEA 62YG) by 15 March, with update by 15 September, a workload schedule based on TYCOMs' GWSRP replacement requirements for FY+1 and a tentative workload schedule based on TYCOMs' GWSRP replacement requirements for FY+2. Schedule development will be based on a dockside delivery date of five months prior to end of overhaul, equipment turnaround time, retrograde equipment available for overhaul, TYCOMs' priority, overhaul cost, projected NAVSEASYSCOM (SEA 62YG) overhaul budget constraints, material support, NAVORDSTA Louisville workload schedules, etc.
- R) (2) Conduct semi-annual GWSRP meeting at NAVORDSTA Louisville in April and October to develop baseline GWSRP schedule finalizing NAVORDSTA Louisville induction/workload for FY+1, baseline GWSRP replacement requirements for FY+2 to be used by program participants in budget projections, and baseline inspections schedule for FY+1.

(3) Subsequent to semi-annual GWSRP meetings submit baseline GWSRP delivery schedule (with monthly GWSRP Schedule) in the format of enclosure (2) to: (R)

- (a) NAVSEASYSKOM SEA 06D (2), SEA 62YGB (2), SEA 61F (1), SEA 621Y (2), SEA 074 (2)
- (b) NAVSEACENLANT (Code 051E)
- (c) NAVSEACENPAC (Code 200C)
- (d) NAVORDSTA Indian Head (Code 5033)
- (e) Applicable TYCOMs
- (f) Applicable PERAs
- (g) Ships Parts Control Center (SPCC) (Code 346)
- (h) Activities identified by TYCOMs and installing activities

(4) As change requests to GWSRP replacement requirements are submitted by TYCOM; review impact in view of cited compensation. Advise NAVSEASYSKOM (SEA 62YG) of impact concerning delivery schedules, industrial workload and additional costs. Provide revised enclosure (2) highlighting NAVSEASYSKOM (SEA 62YGB) approved changes to activities in paragraph 5c(3). (R)

(5) Based on finalized workload schedules submit planned material requirements to SPCC (Code 346) for SPCC managed items and Special Program Requirements (SPR) to Defense Supply Centers (DSC) for DSC managed items in accordance with current regulations, with copies to NAVSEASYSKOM (SEA 62YGB and 61F). (R)

(6) Based on workload schedules submit planned Non-Ready for Issue (RFI) equipment (carcass) requirements for induction to the overhaul line citing equipment type, quantity, NSN and required induction date to NAVSEASYSKOM (SEA 61F) with copy to NAVSEASYSKOM (SEA 62YGB). (R)

(7) Induct carcasses into rework to meet scheduled delivery dates. Overhaul the retrograde equipment in accordance with applicable NAVORDSTA Louisville work process sheets and process inspection procedures. 4N and 6U items will be removed from the carcass in rework and turned into supply as condition "F" and replacement items drawn in accordance with reference (a) (use DD Form 1348-1). (R)

(8) Bring overhauled equipments/components to a baseline ORDALT configuration based on the TYCOM designated ship to receive the equipment/component. Baseline ORDALT will be in compliance with the Fleet Modernization Program (FMP) Alteration Installation Matrix as identified by NAVORDSTA Louisville (Code 5031). All completed equipment will be shipped with configuration verification sheets; unaccomplished ORDALTs will be noted. (R)

R) (9) Quality assurance requirements shall be in accordance with the latest applicable equipment specifications and drawings covering the configuration approved for the TYCOM designated ship. All industrial work will be guaranteed in accordance with the provisions of NAVSEAINST 7600.15. Inspection and acceptance of all units will be performed at NAVORDSTA Louisville using Factory Acceptance Test Specifications or other inspection documents as appropriate.

(10) Provide appropriate cable lengths based on ship designated by TYCOM.

(11) Preserve, package and mark completed equipment in accordance with OP 1810 (latest revision) if applicable and best commercial practices in all other cases. Provide desiccant for overseas shipment or where long term storage applies.

R) (12) Request shipping instructions for all equipments/components shipped under the GWSRP from NAVSEASYSKOM (SEA 61F).

R) (13) Notify NAVSEACENS and receiving activity of shipment providing mode of transportation, shipping data and estimated time of arrival. Furnish a complete inventory and provide test and inspection data.

R) (14) When designated by TYCOM as technical coordinator for removal/installation of equipments/components under the GWSRP, provide assistance as delineated for NAVSEACENS [paragraphs 5b(4)(a) through (h)].

A) d. Installing Activity:

(1) Remove/install and checkout equipments in accordance with documentation furnished by NAVORDSTA Louisville.

(2) Inventory replacement equipment upon arrival. Report shortages and/or damages to NOSL and cognizant NAVSEACEN.

(3) Upon completion of the equipment replacement, report any problems encountered to NAVORDSTA Louisville and the cognizant NAVSEACEN.

e. NAVSEASYSKOM:

R) (1) SEA 62 YG:

(a) Provide overall management of the GWSRP for the Commander, Naval Sea Systems Command.

R) (b) Coordinate program requirements as developed by program participants, with higher authorities during planning, programming and budgeting cycle.

A) (c) Coordinate program requirements with existing maintenance programs to insure an integration of efforts and resources.

(d) Provide approval decision on TYCOM change request based on impact submitted by NAVORDSTA Louisville (Code 20X) and other program considerations. (R)

(e) Provide funding, within GWSRP budget constraints, to NAVORDSTA Louisville, NAVORDSTA Indian Head and the NAVSEACENS for those actions in support of the GWSRP.

(2) SEA 05M/62F (R)

(a) Provide funds for packing, crating and handling (PC&H) of equipment removed from ships via GWSRP that are not directly returned to NAVORDSTA Louisville for induction.

(b) Initiate MILSTRIP documentation for shipment of Non-RFI equipments to meet NAVORDSTA Louisville induction requirements. (R)

(c) Initiate MILSTRIP documentation for shipment of completed equipments/components under the GWSRP.

(d) Provide disposition for equipments/components removed under GWSRP based on NAVSEACEN recommendation. (R)

(3) SEA 07: (A)

(a) Designate a single point of contact for GWSRP in connection with ship overhaul in the private sector. (A)

(b) Designate a single point of contact for GWSRP in connection with ship overhaul in naval shipyards. (A)

f. SPCC Inventory Control Point (ICP). As the program support ICP for guns, surface rocket launchers, and gun fire control systems SPCC shall budget for established requirements and procure/induct into repair, material under its management control.

g. NAVORDSTA Indian Head:

(1) Review material inspection reports submitted by NAVSEACENS (para 5b(5)(c)). Subsequent to review, forward copies of complete material inspection report summaries to NAVSEASYS COM (SEA 62YGB), NAVORDSTA Louisville (Code 20X) and Weapons Quality Engineering Center (WQEC), Concord (Code 384). (R)

(2) Monitor combined NAVSEACEN development of planned inspection schedules and implementation of current year inspection schedules to insure fulfillment of GWSRP objectives. Forward inspection program status, problems and recommended corrective actions on combined NAVSEACEN material inspections.

R)

(3) Maintain, in conjunction with WQEC Concord (Code 384), a program management information system (MIS) for the GWSRP. Forward, on an as published and as applicable basis, MIS products to NAVSEASYS COM (SEA 62YGB) NAVORDSTA Louisville (Code 20X), NAVSEACENS, and TYCOMs.

6. Reports and Forms

a. Report Symbol NAVSEA 8300-1A is assigned to the Gun Weapon System Replacement Program requirements.

b. Report Symbol NAVSEA 8300-1B is assigned to the Gun Weapon System Replacement Program Schedule.

c. DD Form 1348-1 is available from COG "I" and may be requisitioned in accordance with NAVSUP Publications 2002 and 437.

Distribution: (2 copies each)

SNDL 24 Type Commanders (less 24E, 24G, 24H, 24J)
FKM13 SPCC
FKP1J NAVORDSTA
FKP5A NAVSEACEN

Copy to: (2 copies each unless indicated)

SNDL A3 CNO (OP-09B1)
A4A CNM
21A Fleet Commanders-in-Chief
32 Auxiliary Ships
C4J NAVMATDATASYSGRU; PERA (CV) BREM; PERA (CRUDES) PHILA: RESUPSHIP
FB30 NAVSHIPREPAC
FKM22 NAVPUBFORMCEM (400)
FKM27 NPPSMO (SUP 0721/CL)
FKP1B (WQEC Concord only)
FKP7 NAVSHIPYD (Phila Code 1100 only)
FKP7 NAVSHIPYD (less Portsmouth, N.H.)
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**5"/54 GUN MOUNT
SUMMARY SHEET 1**

SHIP _____ HULL _____ DATE INSPECTED _____

MOUNT POSITION _____ SERIAL NO. _____ MK 42 MOD _____

PROCEDURE NO. & IDENTIFICATION	MATERIAL CONDITION LEVEL				COMPONENT ESL
	1	2	3	4	
1. EP1/EP2 Panels					
2. EP3/EP4/EP5 Panels					
3. Electrical Connection Boxes					
4. Train Power Drive					
5. Elevation Power Drive					
6. Shield Assembly					
7. Carriage/Stand/ Roller Path					
8. Empty Case Ejector/ Empty Case Tray					
9. Gas Ejector					
10. Breech Mechanism					
11. Rammer					
12. Left/right Transfer Trays					
13. Left/Right Fuze Setters					
14. Left/Right Cradles					
15. Left/Right Upper Hoists					
16. Ammunition Carrier					
17. "C"/"D" Lower Hoists					
18. "A"/"B" Loader Drums					
19. Lower Accumulator System					
19A. Loader Accumulator System (Mod 10 only)					
20. Upper Accumulator System					
21. Time Cycle Tests					
22. Telescope/Sight					
23. Recoil/Counterrecoil/ Slide Area					
24. HP/LP Air System					

5"/54 GUN MOUNT
SUMMARY SHEET I (CONTINUED)

SHIP _____ HULL _____ DATE INSPECTED _____
MOUNT POSITION _____ SERIAL NO. _____ MK 42 MOD _____

SYSTEM MATERIAL CONDITION LEVEL (MCL) _____ (CURRENT CONDITION)

SYSTEM-LEVEL EQUIPMENT STATUS (BASED ON ADEQUATE MAINTENANCE, INCLUDING RECOMMENDED SUBASSEMBLY REPAIR/REPLACEMENT). ESTIMATED SERVICE LIFE (ESL) _____

REMARKS:

RECOMMENDED SUBASSEMBLY REPLACEMENT (INCLUDE MK & MOD)

UNIT

FSN

APL

RECOMMENDED NEXT INSPECTION DATE _____

COMPLETED BY _____ DATE _____

5"/54 GUN MOUNT
SUMMARY SHEET 2

SHIP _____ HULL _____ DATE INSPECTED _____

MOUNT POSITION _____ SERIAL NO. _____ MK 42 MOD _____

SUMMARY OF NECESSARY REPAIRS:

COMPLETED BY _____ DATE _____

SHIPS POINT OF CONTACT _____

RANK _____ TITLE _____

(Sample)

NAVSEAINST 8300.2A
24 March 1977

Report Symbol NAVSEA 8300-1B

GUN WEAPON SYSTEM REPLACEMENT PROGRAM SCHEDULE

Report Month

Date

HULL NO.	NAME OF SHIP	PRI	QTY	NOMENCLATURE	MK	MOD	INDUCT. DATE	DOCKSIDE DATE	DESTINATION	SER. NO.	SHIPPED DATE	REC. DATE	INST. COMP.	ICN	REMARK
AE 23	NITRO	L9	2	3"/50 Gun Mt.	33	0	1 OCT 76	1 MAY 77	NSC NORFOLK	123	1 APR 77	23 APR	30 JUN 77	0035	
			2	Gun Director	56	8	1 NOV 76	1 MAY 77	NSC NORFOLK	456	1 APR 77	23 APR	30 JUN 77	0047	

Enclosure (2)

APPENDIX F

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

This appendix lists commonly used abbreviations and acronyms.

AAW	Anti-Air Warfare
ADP	Automatic Data Processing
AEL	Allowance Equipage List
Alt	Alteration
APL	Allowance Parts List
ASW	Anti-Submarine Warfare
BOH	Baseline Overhaul
CASREP	Casualty Report
CD (or CRUDES)	Cruisers/Destroyers
CG	Guided Missile Cruiser
CID	Component Identification Number
CIWS	Close-In Weapon System
CMP	Class Maintenance Plan
CNO	Chief of Naval Operations
COG	Cognizance
COMNAVSEASYSKOM	Commander, Naval Sea Systems Command
COSAL	Coordinated Shipboard Allowance List
CRUDES	Cruiser Destroyer
CSMP	Current Ship's Maintenance Project
CSRR	Combat Systems Readiness Review
CSRT	Combat Systems Readiness Test
CY	Calendar Year
D Alt	Alteration authorized and funded by the TYCOM
DD	Destroyer
DDEOC	Destroyer Engineered Operating Cycle
DDG	Guided Missile Destroyer
DFS	Direct Fleet Support
ECR	Equipment Condition Report
EIC	Equipment Identification Code
EMRM	Equipment Maintenance Related Material
EOC	Engineered Operating Cycle
EP	Electronic Panel

ESL	Estimated Service Life
F Alt	Alteration funded by TYCOM and accomplished by forces afloat
FAR	Functions, Assignments, and Responsibilities
FF	Frigate
FMAG	Fleet Maintenance Assistance Group
FMP	Fleet Modernization Program
FMSO	Fleet Material Support Office
FROGS	Fleet Report of Gun Systems
FTG	Gun Fire Control Technician
FY	Fiscal Year
GFCS	Gun Fire Control System
GFE	Government Furnished Equipment
GFM	Government Furnished Material
GMMC	Gunners Mate (MISSILE) Check
GSED	Gun System Engineering Department NOSL
GWS	Gun Weapon System
GWSRP	Gun Weapon System Replacement Program
HM&E	Hull, Mechanical, and Electrical
ICP	Inventory Control Point
IFP	Invitation for Bid
ILS	Integrated Logistic Support
IMA	Intermediate Maintenance Activity
IMMP	Integrated Maintenance and Modernization Planning
INSURV	Inspection and Survey
ISEA	In-Service Engineering Agent
JCN	Job Control Number
K Alt	An alteration authorized and funded by NAVSEA
LOGSAT	Logistics Special Assistance Team
LPWI	Locally Prepared Work Item
MCA	Material Condition Assessment
MCL	Material Condition Level
MCR	Material Condition Review
MDS	Maintenance Data System
MI	Material Inspection
MIP	Maintenance Index Page
MIS	Management Information System
Mk	Mark
Mod	Modification
MRC	Maintenance Requirement Card
MSMS	Maintenance and Support Monitoring System
MSR	Master Ship Repair (Contract)

NAVORDSTA	Naval Ordnance Station
NAVSEASYSKOM	Naval Sea Systems Command
NAVSEACEN	Naval Sea Support Center
NAVSEC	Naval Ship Engineering Command
NAVSUPSYSCOM	Naval Supply Systems Command
NOS	Naval Ordnance Station
NOSIH	Naval Ordnance Station, Indian Head
NOSL	Naval Ordnance Station, Louisville
NRF	Naval Reserve Fleet
NSWSES	Naval Ship Weapons System Engineering Station, Port Hueneme, California
NWPSTA	Naval Weapons Station
OA	Ordnance Alteration (OrdAlt)
O&MN	Operations and Maintenance, Navy (Appropriation)
O&MNR	Operations and Maintenance, Naval Reserve (Appropriation)
OP	Ordnance Publication
OPNAV	Office of the Chief of Naval Operations
OrdAlt	Ordnance Alteration
ORDSAT	Ordnance Special Assistance Team
ORI	Overhaul Replacement Index
ORL	Overhaul Replacement List
OVHL (or O/H)	Overhaul
PERA	Planning and Engineering for Repairs and Alterations: (ASC) - Amphibious Ships and Craft, Norfolk NSYD (CD) - Cruisers/Destroyers, Philadelphia NSYD (CSS) - Combat Support Ships, NAVSEA Industrial Support Office (NISO) San Francisco (CV) - Aircraft Carriers, etc., Puget Sound NSYD (SS) - Submarines, Portsmouth NSYD
PMS	Planned Maintenance System
POA&M	Plan of Action and Milestones
POM	Program Objectives Memorandum
POT&I	Pre-Overhaul Test and Inspection
PUBSAT	Publication Special Assistance Team
QA	Quality Assurance
QPL	Qualified Products List
RAV	Restricted Availability
REFTRA	Refresher Training
RIR	Repair Inspection Requirement
RMMS	Repair Maintenance Management System
ROH	Regular Overhaul
RSPE	Radar Signal Processing Equipment
SARP	Ship Alteration and Repair Package
SCORE	Shipboard Condition Overhaul/Repair Evaluation Manual
SFOMS	Ship's Force Overhaul Management System
ShipAlt	Ship Alteration
SIMA	Shore-Based Intermediate Maintenance Activity

SMA	System Maintenance Analysis
SOAP	Supply Operations Assistance Program
SPCC	Ships Parts Control Center
SRA	Selected Restricted Availability
SSIP	Ship Support Improvement Project
SUPSHIP	Supervisor of Shipbuilding, Conversion, and Repair
SURFLANT	Surface Force Atlantic
SURFPAC	Surface Force Pacific
SSIP	Ship Support Improvement Project
ST	Sonar Technician
SUW	Surface Warfare
SWAB	Ships Work Authorization Boundary
SWLIN	Ship Work List Item Number
SYSCOM	Systems Command
TAD	Temporarily Assigned Duty
TAV	Technical Availability
T&C	Test and Certification Manual
TDS	Target Designation System
3-M	Maintenance and Material Management
TRS	Technical Repair Standard
TSTP	Total Ship Test Program
2-Kilo (2K)	Maintenance Action Form (OPNAV 4790/2K)
TYCOM	Type Commander
WDC	Work Definition Conference
WQEC	Weapons Quality Evaluation Center